Spectra Energy

Docket Number CP08-________

# ENVIRONMENTAL REPORT
Accompanying
FERC 7C Application

## Algonquin Gas Transmission, LLC

## J-2 Loop Project

Medford and Somerville,
Massachusetts

## VOLUME II A - PUBLIC

Resource Reports 1 - 13
and
Appendices A – E

April 2008

# MIDDLESEX COUNTY MASSACHUSETTS
# CITY OF SOMERVILLE

## RIGHT-OF-WAY

TRACT NUMBERS
OWNERSHIP/AGENCY

TRACT J-2L-6
CITY OF SOMERVILLE
SCHOOL STREET

## SURVEY DATA

SURVEY COMPANY: VHB WATERTOWN MA
FIELD BOOK:
PAGES:

## WORKSPACE DETAILS
SCALE: N.T.S.

LEGEND

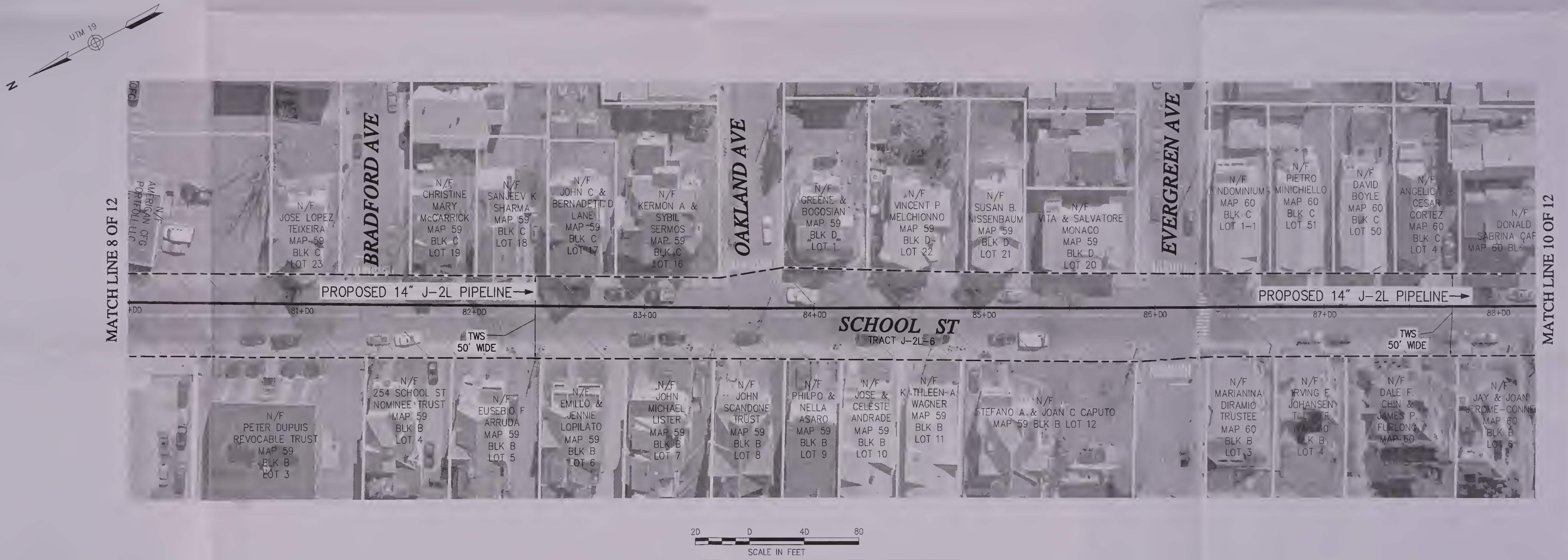
- ⊏⊐ PROPOSED NEW PERMANENT EASEMENT
- ▭ PROPOSED STAGING AREA
- ▭ PROPOSED TEMPORARY ACCESS ROAD (TAR)
- ▭ PROPOSED TEMPORARY WORKSPACE (TWS)
- ▨ PROPOSED ADDITIONAL TEMPORARY WORKSPACE (AWS)

## ALIGNMENT DETAIL

LEGEND

- PROPERTY LINE
- PROPOSED PIPELINE
- EXISTING AGT EASEMENT
- TEMP. WORKSPACE
- ADDITIONAL TEMP. WORKSPACE
- STAGING AREA
- TEMP. ACCESS ROAD
- EXISTING AGT PIPELINE
- EXISTING EASEMENT
- STREAM/DITCH
- WETLAND BOUNDARY
- WETLANDS
- ◇ PIPELINE MILEPOST

DATE OF AERIAL PHOTOGRAPHY: 3-29-2007


UTM 19
N
MATCH LINE 8 OF 12
MATCH LINE 10 OF 12
BRADFORD AVE
OAKLAND AVE
EVERGREEN AVE
SCHOOL ST
TRACT J-2L-6
PROPOSED 14" J-2L PIPELINE→
PROPOSED 14" J-2L PIPELINE→
TWS 50' WIDE
TWS 50' WIDE
81+00
82+00
83+00
84+00
85+00
86+00
87+00
88+00
N/F AMERICAN CFG PORTFOLI LLC
N/F JOSE LOPEZ TEIXEIRA MAP 59 BLK C LOT 23
N/F CHRISTINE MARY McCARRICK MAP 59 BLK C LOT 19
N/F SANJEEV K SHARMA MAP 59 BLK C LOT 18
N/F JOHN C & BERNADETT D LANE MAP 59 BLK C LOT 17
N/F KERMON A & SYBIL SERMOS MAP 59 BLK C LOT 16
N/F GREENE & BOGOSIAN MAP 59 BLK D LOT 1
N/F VINCENT P MELCHIONNO MAP 59 BLK D LOT 22
N/F SUSAN B. NISSENBAUM MAP 59 BLK D LOT 21
N/F VITA & SALVATORE MONACO MAP 59 BLK D LOT 20
N/F CONDOMINIUM MAP 60 BLK C LOT 1-1
N/F PIETRO MINICHIELLO MAP 60 BLK C LOT 51
N/F DAVID BOYLE MAP 60 BLK C LOT 50
N/F ANGELIC CESAR CORTEZ MAP 60 BLK C LOT 4
N/F DONALD SABRINA CAF MAP 60 BL
N/F PETER DUPUIS REVOCABLE TRUST MAP 59 BLK B LOT 3
N/F 254 SCHOOL ST NOMINEE TRUST MAP 59 BLK B LOT 4
N/F EUSEBIO F ARRUDA MAP 59 BLK B LOT 5
N/F EMILLO & JENNIE LOPILATO MAP 59 BLK B LOT 6
N/F JOHN MICHAEL LISTER MAP 59 BLK B LOT 7
N/F JOHN SCANDONE TRUST MAP 59 BLK B LOT 8
N/F PHILPO & NELLA ASARO MAP 59 BLK B LOT 9
N/F JOSE & CELESTE ANDRADE MAP 59 BLK B LOT 10
N/F KATHLEEN A WAGNER MAP 59 BLK B LOT 11
N/F STEFANO A & JOAN C CAPUTO MAP 59 BLK B LOT 12
N/F MARIANINA DIRAMIO TRUSTEE MAP 60 BLK B LOT 3
N/F IRVING E JOHANSEN TRUSTEE MAP 60 BLK B LOT 4
N/F DALE F. CHIN & JAMES P. FURLONG MAP 60
N/F JAY & JOAN JEROME-CONNE MAP 60 BLK B LOT 6
20 0 40 80
SCALE IN FEET

## General Notes

1) THE PROPERTY LINES SHOWN ON THIS PLAN WERE COMPILED FROM LOCAL ASSESSOR'S PLATS AND FROM PREVIOUS PLANS AND DEEDS OF RECORD. VHB HAS NOT PERFORMED A FIELD SURVEY TO VERIFY THE PROPERTY LINES.
2) THE EXISTING CONDITIONS SHOWN ON THIS PLAN WERE DEVELOPED FROM A COMBINED EFFORT OF AERIAL PHOTOGRAMMETRIC MAPPING BY GOLDEN AERIAL, INC, BASED ON AERIAL PHOTOGRAPHS TAKEN ON MARCH 29, 2007, AND AUGMENTED BY AN ON-THE-GROUND SURVE PERFORMED BY VHB DURING NOVEMBER 2007.
3) HORIZONTAL DATUM IS BASED ON UTM 19 PROJECTIONS, NAD 1983.
4) THE WETLANDS SHOWN ON THIS PLAN WERE DELINEATED BY ENSR ENVIRONMENTAL INC, AND FIELD SURVEYED BY VHB IN NOVEMBER 2007.

E & S FIGURES APPLICABLE TO ALL AREAS

| DWG. NO. | REFERENCE DWG. | REV | DSN | CK | DESCRIPTION |
|---|---|---|---|---|---|
| 4981 | MHWY L.O. 1960 INT. 93 | △ | | | |
| 5561 | MHWY L.O. 1966 ROUTE 93 | △ | | | |
| – | MHWY L.O. MYSTIC AVE. MEDFORD AND SOMERVILLE | △ | | | |
| 5563 | MHWY L.O. 1908/1966 INT 93 | △ | | | |
| 5564 | MHWY L.O. 1966 INT. 93 | △ | | | |
| 5723 | MHWY L.O. 1966 INT. 93 | △ | | | |

IG.#

VHB
Vanasse Hangen Brustlin, Inc.
Transportation
Land Development
Environmental Services
101 Walnut Street, P.O. Box 9151
Watertown, Massachusetts 02471-9151
617 924 1770 • FAX 617 924 2286

| ENGINEERING APPROVALS | | | | |
|---|---|---|---|---|
| DRAWN BY: | BID | | CONSTRUCTION | |
| SLT | | 4/08 | | |
| | | | | |
| | | | | |
| TITLE | SIGNATURE | DATE | SIGNATURE | DATE |

**J-2 LOOP PROJECT**
ALIGNMENT SHEET

LOC. SOMERVILLE MA

Spectra Energy
Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

| YEAR: 2008 | W.O. 004110598 | SCALE: 1"=40' | DWG. Z-2000 9 OF 12 | REV. A |
|---|---|---|---|---|

\\M wald\ld\08 0.52\cad\s \p anset\08000.52-AGT- ERC3- 8. wg - PLOT TIME 4 2 2008 2:07 PM

# MIDDLESEX COUNTY MASSACHUSETTS
# CITY OF SOMERVILLE

## RIGHT-OF-WAY

TRACT NUMBERS
OWNERSHIP/AGENCY

TRACT J-2L-6
CITY OF SOMERVILLE
SCHOOL STREET

TRACT J-2L-7
CITY OF SOMERVILLE
MEDFORD STREET

## SURVEY DATA

SURVEY COMPANY: VHB WATERTOWN MA
FIELD BOOK:
PAGES:

STA:94-97
PI 6°-05' LT.
STA:95+11
RIGHT OF WAY
STA:95+35
PI 40°-35' LT.
STA:95+50
PI 16°-13' LT.

## WORKSPACE DETAILS
SCALE: N.T.S.

LEGEND

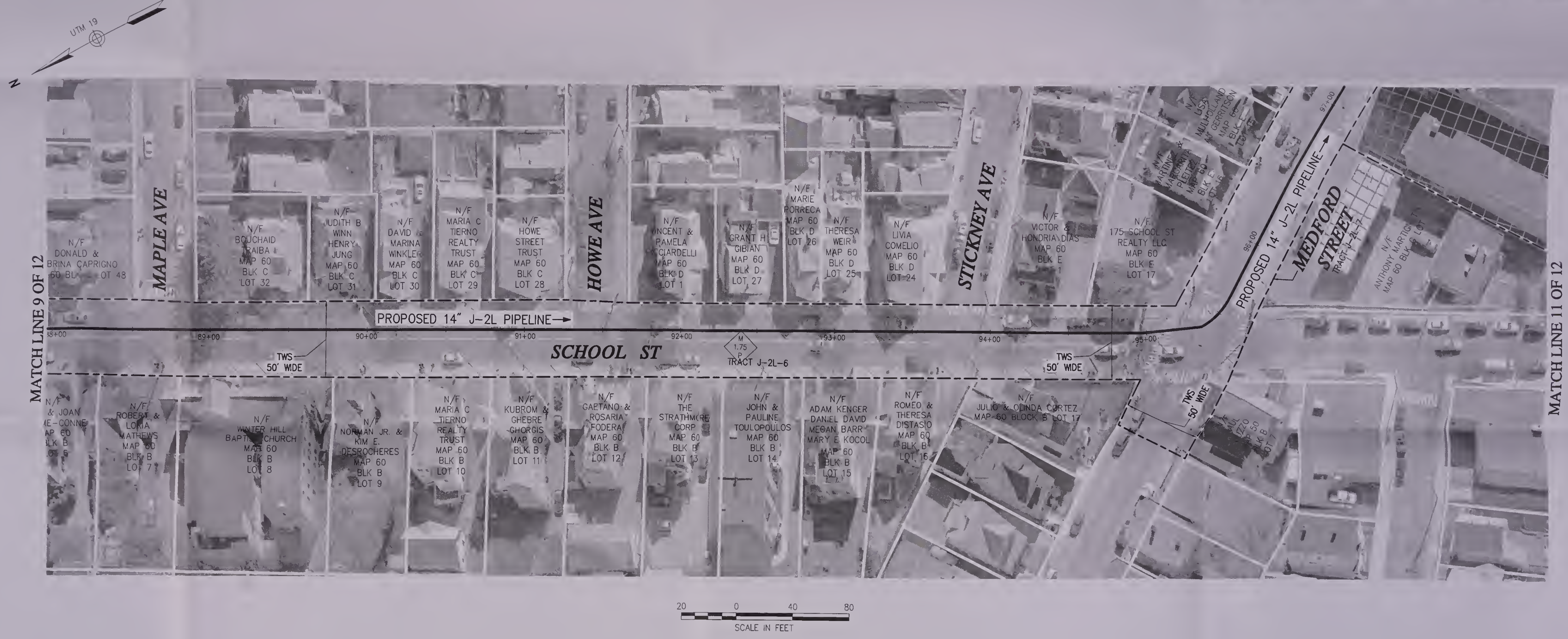
| | |
|---|---|
| ⊏⊐ | PROPOSED NEW PERMANENT EASEMENT |
| ▭ | PROPOSED STAGING AREA |
| ▭ | PROPOSED TEMPORARY ACCESS ROAD (TAR) |
| ▭ | PROPOSED TEMPORARY WORKSPACE (TWS) |
| ▭ | PROPOSED ADDITIONAL TEMPORARY WORKSPACE (AWS) |

## ALIGNMENT DETAIL

LEGEND

| | |
|---|---|
| ▬ | PROPERTY LINE |
| ━ | PROPOSED PIPELINE |
| — — | EXISTING AGT EASEMENT |
| — - — | TEMP. WORKSPACE |
| — - — | ADDITIONAL TEMP. WORKSPACE |
| — - — | STAGING AREA |
| — - — | TEMP. ACCESS ROAD |
| — — | EXISTING AGT PIPELINE |
| - - - - | EXISTING EASEMENT |
| — — | STREAM/DITCH |
| —— | WETLAND BOUNDARY |
| ▨ | WETLANDS |
| ◇ M X.X P | PIPELINE MILEPOST |

DATE OF AERIAL PHOTOGRAPHY: 3-29-2007


UTM 19
N
MATCH LINE 9 OF 12
MAPLE AVE
HOWE AVE
STICKNEY AVE
SCHOOL ST
MEDFORD STREET
TRACT J-2L-7
PROPOSED 14" J-2L PIPELINE
PROPOSED 14" J-2L PIPELINE
TRACT J-2L-6
M 1.75 P
TWS 50' WIDE
TWS 50' WIDE
TWS 50' WIDE
88+00
89+00
90+00
91+00
92+00
93+00
94+00
95+00
96+00
97+00
N/F DONALD & BRINA CAPRIGNO 60 BL LOT 48
N/F BOUCHAID TRAIBA MAP 60 BLK C LOT 32
N/F JUDITH B WINN HENRY JUNG MAP 60 BLK C LOT 31
N/F DAVID & MARINA WINKLER MAP 60 BLK C LOT 30
N/F MARIA C TIERNO REALTY TRUST MAP 60 BLK C LOT 29
N/F HOWE STREET TRUST MAP 60 BLK C LOT 28
N/F VINCENT & PAMELA CIARDELLI MAP 60 BLK D LOT 1
N/F GRANT H GIBIAN MAP 60 BLK D LOT 27
N/F MARIE PORRECA MAP 60 BLK D LOT 26
N/F THERESA WEIR MAP 60 BLK D LOT 25
N/F LIVIA COMELIO MAP 60 BLK D LOT 24
N/F VICTOR & HONDRIA DIAS MAP 60 BLK E
N/F 175 SCHOOL ST REALTY LLC MAP 60 BLK E LOT 17
N/F MARTINEZ & MARGARITA PLEITEZ MAP 60 BLK E LOT 16
N/F LISA MULHOLLAND & GERRITSON MAP 60 BLK E LOT 15
N/F ANTHONY MARTIG MAP 60 BLK 6 LOT
N/F & JOAN ME-CONNE MAP 60 BLK B LOT 6
N/F ROBERT & LORIA MATHEWS MAP 60 BLK B LOT 7
N/F WINTER HILL BAPTIST CHURCH MAP 60 BLK B LOT 8
N/F NORMAN JR. & KIM E. DESROCHERES MAP 60 BLK B LOT 9
N/F MARIA C TIERNO REALTY TRUST MAP 60 BLK B LOT 10
N/F KUBROM & GHEBRE GHORGIS MAP 60 BLK B LOT 11
N/F GAETANO & ROSARIA FODERA MAP 60 BLK B LOT 12
N/F THE STRATHMORE CORP MAP 60 BLK B LOT 13
N/F JOHN & PAULINE TOULOPOULOS MAP 60 BLK B LOT 14
N/F ADAM KENGER DANIEL DAVID MEGAN BARR MARY E KOCOL MAP 60 BLK B LOT 15
N/F ROMEO & THERESA DISTASIO MAP 60 BLK B LOT 16
N/F JULIO & OLINDA CORTEZ MAP 60 BLOCK B LOT 17
N/F PAUL IZZO MAP 50 BLK B LOT 7
MATCH LINE 11 OF 12
20 0 40 80
SCALE IN FEET

## General Notes

1) THE PROPERTY LINES SHOWN ON THIS PLAN WERE COMPILED FROM LOCAL ASSESSOR'S PLATS AND FROM PREVIOUS PLANS AND DEEDS OF RECORD. VHB HAS NOT PERFORMED A FIELD SURVEY TO VERIFY THE PROPERTY LINES.

2) THE EXISTING CONDITIONS SHOWN ON THIS PLAN WERE DEVELOPED FROM A COMBINED EFFORT OF AERIAL PHOTOGRAMMETRIC MAPPING BY GOLDEN AERIAL, INC. BASED ON AERIAL PHOTOGRAPHS TAKEN ON MARCH 29, 2007, AND AUGMENTED BY AN ON-THE-GROUND SURVEY PERFORMED BY VHB DURING NOVEMBER 2007.

3) HORIZONTAL DATUM IS BASED ON UTM 19 PROJECTIONS, NAD 1983.

4) THE WETLANDS SHOWN ON THIS PLAN WERE DELINEATED BY ENSR ENVIRONMENTAL INC, AND FIELD SURVEYED BY VHB IN NOVEMBER 2007.

E & S FIGURES APPLICABLE TO ALL AREAS

| DWG. NO. | REFERENCE DWG. |
|---|---|
| 4981 | MHWY L.O. 1960 INT. 93 |
| 5561 | MHWY L.O. 1966 ROUTE 93 |
| – | MHWY L.O. MYSTIC AVE. MEDFORD AND SOMERVILLE |
| 5563 | MHWY L.O. 1908/1966 INT 93 |
| 5564 | MHWY L.O. 1966 INT. 93 |
| 5723 | MHWY L.O. 1966 INT. 93 |

IC.#

| REV | DSN | CK | DESCRIPTION |
|---|---|---|---|
| △ | | | |
| △ | | | |
| △ | | | |
| △ | | | |
| △ | | | |
| △ | | | |

**VHB**
*Vanasse Hangen Brustlin, Inc.*
Transportation
Land Development
Environmental Services
101 Walnut Street, P.O. Box 9151
Watertown, Massachusetts 02471-9151
617 924 1770 • FAX 617 924 2286

ENGINEERING APPROVALS

| DRAWN BY: | BID | | CONSTRUCTION | |
|---|---|---|---|---|
| SLT | | 4/08 | | |
| | | | | |
| | | | | |
| | | | | |
| TITLE | SIGNATURE | DATE | SIGNATURE | DATE |

**J-2 LOOP PROJECT**
ALIGNMENT SHEET

LOC. SOMERVILLE MA

Spectra Energy
Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

| YEAR: 2008 | W.O. 004110598 | SCALE: 1"=40' | DWG. Z-2000 10 OF 12 | REV. A |
|---|---|---|---|---|

\\Mowl:d\d\0800 5\ :d\sr\ rset\ 080 AL ER03 08.dwg P ME: 4 2

b 26990817

Spectra Energy

REF
338.56
AL

Docket Number CP08-________

# ENVIRONMENTAL REPORT
Accompanying
FERC 7C Application

## Algonquin Gas Transmission, LLC

## J-2 Loop Project

Medford and Somerville,
Massachusetts

## VOLUME II A - PUBLIC

Resource Reports 1 - 13
and
Appendices A – E

April 2008

## TABLE OF CONTENTS

## VOLUME IIA - RESOURCE REPORTS

RESOURCE REPORT 1 GENERAL PROJECT DESCRIPTION

RESOURCE REPORT 2 WATER USE AND QUALITY

RESOURCE REPORT 3 FISH, WILDLIFE AND VEGETATION

RESOURCE REPORT 4 CULTURAL RESOURCES

RESOURCE REPORT 5 SOCIOECONOMICS

RESOURCE REPORT 6 GEOLOGICAL RESOURCES

RESOURCE REPORT 7 SOILS

RESOURCE REPORT 8 LAND USE, RECREATION AND AESTHETICS

RESOURCE REPORT 9 AIR AND NOISE QUALITY

RESOURCE REPORT 10 ALTERNATIVES

RESOURCE REPORT 11 RELIABILITY AND SAFETY

RESOURCE REPORT 12 PCB CONTAMINATION

RESOURCE REPORT 13 ADDITIONAL INFORMATION RELATED TO LNG PLANTS

# APPENDICES

**Volume IIA – Public**

| | |
|---|---|
| Resource Report Figures | Appendix A |
| Agency Correspondence | Appendix B |
| FERC Plan and Procedures | Appendix C |
| Algonquin's Erosion &Sedimentation Control Plan | Appendix D |
| Typical Right-of-Way Cross Sections | Appendix E |

**Volume IIB – Public**

| | |
|---|---|
| USGS Full Size Quadrangle Maps | Appendix F |
| National Wetland Inventory Maps | Appendix G |
| Alignment Sheets | Appendix H |

**Volume III – Critical Energy Infrastructure Information – Not for Public Release**

| | |
|---|---|
| Aboveground Facility Plot Plans | Appendix I |

**Volume IV – Privileged / Confidential Information – Not for Public Release**

| | |
|---|---|
| List of Affected Landowners | Appendix J |
| Cultural Resource Survey Report | Appendix K |

## LIST OF ACRONYMS

| | |
|---|---|
| **ACEC** | Area of Critical Environmental Concern |
| **ATWS** | Additional Temporary Work Space |
| **Algonquin** | Algonquin Gas Transmission, LLC |
| **BMP** | Best Management Practice |
| **CDF** | Controlled Density Fill |
| **CFR** | Code of Federal Regulations |
| **CO** | Carbon Monoxide |
| **CRP** | Conservation Resource Protection |
| **CSO** | Combined Sewer Overflow |
| **CZM** | Massachusetts Coastal Zone Management Agency |
| **DCR** | Department of Conservation and Recreation |
| **DEP** | Massachusetts Department of Environmental Protection |
| **DOT** | United States Department of Transportation |
| **ER** | Environmental Report |
| **EPA** | United States Environmental Protection Agency |
| **E&SCP** | Algonquin's Erosion and Sedimentation Control Plan |
| **EFH** | Essential Fish Habitat |
| **FERC** | Federal Energy Regulatory Commission |
| **gpd** | gallons per day |
| **I-93** | Interstate 93 |
| **IWPA** | Interim Wellhead Protection Areas |
| **Ldn** | day-night sound level |
| **LNG** | Liquefied Natural Gas |
| **Plan** | FERC *Erosion Control, Revegetation and Maintenance Plan* |
| **Procedures** | *Wetland and Waterbody Construction and Mitigation Procedures* |
| **Project** | J-2 Loop Project |
| **MHD** | Massachusetts Highway Department |
| **MADFW** | Massachusetts Division of Fisheries and Wildlife |
| **MAOP** | Maximum Allowable Operating Pressure |

| | |
|---|---|
| **MP** | Mileposts |
| **MWRA** | Massachusetts Water Resources Authority |
| **NHESP** | Massachusetts Natural Heritage and Endangered Species Program |
| **NMFS** | National Marine Fisheries Service |
| **NOx** | Nitrogen Oxide |
| **NPS** | United States National Park Service |
| **NRCS** | Natural Resource Conservation Service |
| **NSTAR** | NSTAR Gas Company |
| **NWI** | National Wetland Inventory |
| **OD** | Outside Diameter |
| **ORW** | Outstanding Resource Waters |
| **PCB** | Polychlorinated Biphenyls |
| **ppm** | parts per million |
| **psig** | pounds per square inch |
| **ROW** | Right-of-Way |
| **SHPO** | Massachusetts Historical Commission |
| **SPCC** | Spill Prevention Controls and Countermeasures Plan |
| **SSURGO** | USDA NRCS Geographic Database |
| **SWAP** | Source Water Assessment and Protection |
| **USDA** | United States Department of Agriculture |
| **USFWS** | United States Fish and Wildlife Service |
| **USGS** | United States Geological Service |
| **Zone II** | DEP Approved Wellhead Protection Area |

Spectra Energy

# ALGONQUIN GAS TRANSMISSION, LLC

# J-2 LOOP PROJECT

## *Resource Report 1*

## *General Project Description*

# RESOURCE REPORT 1 – GENERAL PROJECT DESCRIPTION FERC ENVIRONMENTAL CHECKLIST

| Part 380 – Minimum Filing Requirements for Environmental Reports | Company Compliance or Inapplicability of Requirement |
|---|---|
| Provide a detailed description and location map of the Project facilities (§ 380.12 (c)(1)). | Section 1.0, 1.1.2<br>Figure 1-1<br>Appendix F<br>Appendix G |
| Describe any non-jurisdictional facilities that would be built in association with the Project (§ 380.12 (c)(2)). | Section 1.7 |
| Provide current original U.S. Geological Survey (USGS) 7.5-minute series topographic maps with mileposts showing the Project facilities (§ 380.12 (c)(3)). | Appendix F |
| Provide aerial images or photographs or alignment sheets based on these sources with mileposts showing the Project facilities (§ 380.12 (c)(3)). | Appendix H |
| Provide plot / site plans of compressor stations showing the location of the nearest noise-sensitive areas (NSA) within 1 mile (§ 380.12 (c)(3,4)). | No compressor station facilities proposed as part of Project. Requirement Not Applicable. |
| Describe construction and restoration methods (§ 380.12 (c)(6)). | Section 1.3 |
| Identify the permits required for construction across surface waters (§ 380.12 (c)(9)). | Table 1.6-1 |
| Provide the names and addresses of all affected landowners and certify that all affected landowners will be notified as required in §157.6(d) (§ 380.12 (c)(10)). | Appendix J<br>Section 1.8 |

# TABLE OF CONTENTS

1.0 GENERAL PROJECT DESCRIPTION ..... 1
- 1.1 PROPOSED FACILITIES ..... 1
  - 1.1.1 Purpose and Need ..... 2
  - 1.1.2 Location and Description of Facilities ..... 2
  - 1.1.3 Location Maps, Detailed Site Maps, and Plot/Site Maps ..... 3
- 1.2 LAND REQUIREMENTS ..... 3
  - 1.2.1 Pipeline Facilities ..... 3
  - 1.2.2 Aboveground/Ancillary Facilities ..... 6
  - 1.2.3 Summary of Construction and Operation Land Requirements ..... 7
- 1.3 CONSTRUCTION PROCEDURES ..... 8
  - 1.3.1 Pipeline ..... 8
  - 1.3.2 Aboveground/Ancillary Facilities ..... 9
  - 1.3.3 Timeframe for Construction ..... 9
  - 1.3.4 Environmental Training for Construction ..... 9
- 1.4 OPERATION AND MAINTENANCE PROCEDURES ..... 10
- 1.5 FUTURE PLANS AND ABANDONMENT ..... 10
  - 1.5.1 Future Plans ..... 10
  - 1.5.2 Abandonment ..... 11
- 1.6 PERMITS AND APPROVALS ..... 11
- 1.7 NONJURISDICTIONAL FACILITIES ..... 17
- 1.8 LANDOWNER INFORMATION ..... 18
  - 1.8.1 Systematic Stakeholder Outreach ..... 19
  - 1.8.2 Impacted Landowner Outreach ..... 20
  - 1.8.3 Website ..... 20
  - 1.8.4 Informational Open Houses ..... 20
  - 1.8.5 FERC Site Visits and Scoping Meetings ..... 21
  - 1.8.4 Algonquin's Public and Government Relations Team ..... 21

# LIST OF TABLES

1.1-1 Proposed Pipeline Facilities for the J-2 Loop Project 2
1.1-2 Proposed Aboveground/Ancillary Facility Modifications for the J-2 Loop Project 3
1.2-1 Land Requirements for the J-2 Loop Project Pipeline Facilities 4
1.2-2 Temporary and Permanent Access Roads for the J-2 Loop Project 6
1.2-3 Land Requirements for Additional Temporary Workspace / Staging Areas for the J-2 Loop Project 6
1.2-4 Land Requirements for the J-2 Loop Project Aboveground/Ancillary Facilities 7
1.2-5 Summary of Land Requirements for the J-2 Loop Project 8
1.6-1 Information on Federal, State and Local Approvals for the J-2 Loop Project 12
1.6-2 Agency Correspondences and Responses for the J-2 Loop Project 13
1.8-1 Libraries and Newspapers within the J-2 Loop Project Area 19
1.8-2 Stakeholder Contact List 22

# LIST OF FIGURES

1-1 J-2 Loop Project – Project Overview Map
1.1-1 J-2 Loop Project – Topographic Project Overview Map

# 1.0 GENERAL PROJECT DESCRIPTION

Algonquin Gas Transmission, LLC ("Algonquin"), an indirect and wholly owned subsidiary of Spectra Energy Corp, is filing an application for a *Certificate of Public Convenience and Necessity* with the Federal Energy Regulatory Commission ("FERC") under Section 7 of the Natural Gas Act to construct, operate, own new facilities and modify existing facilities in Middlesex County, Massachusetts. Algonquin is proposing the J-2 Loop Project (the "Project") to provide additional volumes of natural gas to NSTAR Gas Company ("NSTAR") within the Boston metropolitan area.

The Project will include the construction and installation of approximately 2.29 miles of new 14-inch outside diameter ("OD") natural gas loop pipeline and the addition of above and below ground facilities within the cities of Medford and Somerville, Massachusetts. The Project commences at an existing meter station located adjacent to the Mystic Valley Parkway in Medford and travels west along the east bound side of the Mystic Valley Parkway Interchange to Mystic Avenue. Continuing to the southeast, the proposed alignment parallels the existing J-2 pipeline within the Mystic Avenue corridor to Temple Street in Somerville. The alignment then continues west and south within the Temple, Broadway, and School Street corridors, and southeast within the Medford Street corridor to a terminus / tie-in to the existing NSTAR system adjacent to the McGrath Highway (Route 28) / railroad track overpass in Somerville.

Resource Report 1 describes the Project facilities, the purpose and need for the proposed expansion, and the land requirements associated with the construction and operation of the pipeline. The proposed facilities are described geographically in a general north-to-south / west-to-east direction. The nomenclature used to identify resources and facilities along the proposed pipeline lateral route throughout this Environmental Report ("ER") and on the alignment sheets utilizes Mileposts ("MP") commencing at the existing meter station in Medford (MP 0.0). The U.S. Geological Service ("USGS") topographic quadrangle maps (Appendix F) and the National Wetland Inventory ("NWI") maps (Appendix G) also identify major mileposts along the proposed alignment.

Additionally, Resource Report 1 discusses the proposed construction procedures, the operation and maintenance practices, the status of Project permits and approvals and if any foreseeable plans for future expansion or abandonment of the proposed facilities has been determined. The landowners whose properties will be crossed or affected by construction and/or operation of the proposed Project are identified in Appendix J of this document.

## 1.1 PROPOSED FACILITIES

The Project consists of the construction and operation of a new 14-inch OD loop pipeline and valve sites to provide additional volumes of natural gas to NSTAR. Descriptions for the Project facilities are presented in Section 1.1.2. A Project overview map is provided as Figure 1-1, and full-size USGS 7.5-minute series topographic maps showing the Project areas are located in Appendix F. Additionally, Appendix A also provides 8.5 x 11-inch USGS 7.5-minute series topographic excerpts showing the Project alignment.

### 1.1.1 Purpose and Need

NSTAR has identified the need to expand its existing natural gas distribution system within the greater Boston metropolitan area, specifically Medford and Somerville, to ensure continued reliability for its current load and to meet future demand. The Project will extend Algonquin's facilities through the installation of approximately 2.29 miles of 14-inch OD pipeline. The new pipeline will commence at the point of interconnect with the existing J-1 System adjacent to the Mystic Valley Parkway and terminate / tie-in to the existing NSTAR pipeline adjacent to the McGrath Highway (Route 28) / railroad track overpass in Somerville. Algonquin's proposed facilities are fully integrated elements necessary for successful completion of the Project.

NSTAR is the local distribution company with existing service from Algonquin. NSTAR's service area currently includes large portions of the greater Boston metropolitan area including the proposed Project area in its entirety. NSTAR's distribution system in Medford and Somerville is currently operating at or near minimum design pressure in some areas and NSTAR is approaching the limit of their ability to meet current and future demand load. The Project will provide needed pressure support and reliable pipeline gas supply to accommodate future demand along NSTAR's greater Boston Metropolitan distribution system.

### 1.1.2 Location and Description of Facilities

A summary of the proposed Project's pipeline facilities including pipe diameters, approximate length, MPs and type of activity is provided in Table 1.1-1. A summary of the proposed aboveground / ancillary facilities including type, type of activity at each facility and location is provided in Table 1.1-2. The capacity of the Project will be approximately 140,000 Dth/đ, and maximum Allowable Operating Pressure ("MAOP") of the proposed pipeline will be 433 pounds per square inch ("psig").

**TABLE 1.1-1**
**PROPOSED PIPELINE FACILITIES FOR THE PROPOSED J-2 LOOP PROJECT**

| Facility | Pipeline Diameter and Type | Approximate Length (miles) | Mileposts | City | County and State |
|---|---|---|---|---|---|
| Pipeline | 14" / New Installation | 0.60 | MP 0.0 to MP 0.60 | Medford | Middlesex, MA |
| Pipeline | 14" / New Installation | 1.69 | MP 0.6 to MP 2.29 | Somerville | Middlesex, MA |

**TABLE 1.1-2**
**PROPOSED ABOVEGROUND / ANCILLARY FACILITY MODIFICATIONS FOR THE J-2 LOOP PROJECT**

| Facility | New/ Modified | Approximate Milepost | City | County and State |
|---|---|---|---|---|
| Meter Station<br>Pig Launcher | Modified | 0.0 | Medford | Middlesex, MA |
| Valve<br>Pig Receiver | New | 2.29 | Somerville | Middlesex, MA |

### 1.1.3 Location Maps, Detailed Site Maps, and Plot/Site Maps

Appendix F includes 1:24,000 scale full-size USGS topographic maps of the proposed Project facilities. Appendix G provides 1:24,000-scale U.S. Fish and Wildlife Service ("USFWS") NWI Maps for the proposed Project area. Appendix H provides 1-inch = 40-foot scale aerial photo-based alignment sheets depicting the construction workspaces and permanent right-of-way ("ROW"). The aerial photography for the photo-based alignment sheets was taken in November 2007. The photo-based alignment sheets in Appendix H have incorporated civil and environmental survey data and depict property boundaries, waterbodies (including streams and drainages) and wetland resource areas.

## 1.2 LAND REQUIREMENTS

### 1.2.1 Pipeline Facilities

The Project alignment sheets provided in Appendix H depict the size and location of land required for the construction and operation of the facilities including the overall ROW (consisting of the permanent ROW and temporary workspace), additional temporary work space ("ATWS"), staging areas, and access roads. In addition, figures included in Appendix E illustrate the typical ROW configurations for the Project.

Land requirements for the construction and operation of the pipeline facilities are identified in Tables 1.2-1, 1.2-2 and 1.2-3. The majority of the Project consists of the installation of pipeline within existing paved roadways. Due to the urban setting of the alignment, construction workspace will be variable in width with no standard workspace configuration. In areas where the pipeline is co-located within the Massachusetts Highway Department ("Mass Highway") layout or directly within city streets, there will be no permanent easement as the occupation of the pipeline will be by permit. These areas are detailed within the Project alignment sheets (Appendix H).

## TABLE 1.2-1
## LAND REQUIREMENTS FOR THE J-2 LOOP PROJECT
## PIPELINE FACILITIES

| Facility | ROW Cross-Section[a] | | Length (Linear Feet) | Land Affected During Construction[b] (acres) | Land Affected During Operation[c] (acres) |
|---|---|---|---|---|---|
| | Figure Number | Mileposts | | | |
| Pipeline | 1 | 0-0.005 | 25 | 0.27 | 0.04 |
| | 2 | 0.005-0.10 | 522 | 1.42 | 0 |
| | 3 | 0.10-0.12 | 118 | 0.27 | 0 |
| | 4 | 0.12-0.13 | 59 | 0.29 | 0 |
| | 5 | 0.13-0.14 | 48 | 0.10 | 0 |
| | 6 | 0.14-0.34 | 1,050 | 2.87 | 0 |
| | 4 | 0.34-0.61 | 1,394 | 3.09 | 0 |
| | 7 | 0.61-1.01 | 2,170 | 3.34 | 0 |
| | 8 | 1.01-1.11 | 478 | 2.17 | 0 |
| | 9 | 1.11-1.13 | 87 | 0.15 | 0 |
| | 7 | 1.13-1.19 | 332 | 0.50 | 0 |
| | 8 | 1.19-1.20 | 51 | 0.15 | 0 |
| | 9 | 1.20-1.22 | 99 | 0.70 | 0 |
| | 10 | 1.22-1.23 | 93 | 0.17 | 0 |
| | 7 | 1.23-1.38 | 758 | 1.16 | 0 |
| | 8 | 1.38-1.39 | 71 | 0.26 | 0 |
| | 7 | 1.39-1.42 | 156 | 0.25 | 0 |
| | 4 | 1.42-1.50 | 435 | 0.96 | 0 |

## TABLE 1.2-1
## LAND REQUIREMENTS FOR THE J-2 LOOP PROJECT PIPELINE FACILITIES

| Facility | ROW Cross-Section[a] | | Length (Linear Feet) | Land Affected During Construction[b] (acres) | Land Affected During Operation[c] (acres) |
|---|---|---|---|---|---|
| | Figure Number | Mileposts | | | |
| Pipeline | 11 | 1.50-1.83 | 1740 | 2.02 | 0 |
| | 12 | 1.83-1.89 | 332 | 1.46 | 0 |
| | 13 | 1.89-1.90 | 46 | 0.03 | 0.03 |
| | 14 | 1.90-1.93 | 116 | 0.10 | 0.07 |
| | 15 | 1.90-1.96 | 158 | 1.14 | 0.11 |
| | 16 | 1.96-1.97 | 81 | 0.05 | 0.05 |
| | 17 | 1.97-1.98 | 42 | 0.03 | 0.03 |
| | 11 | 1.98-2.22 | 1,262 | 1.37 | 0 |
| | 10 | 2.22-2.25 | 176 | 0.16 | 0 |
| | 3 | 2.25-2.29 | 215 | 0.49 | 0 |
| | **TOTAL** | | 12,114 | 24.97 | 0.33 |

[a] See Appendix E for ROW Configurations.
[b] Construction ROW is based on the extent of permanent, temporary and additional temporary workspace.
[c] Permanent ROW is based on the extent of the ROW that will be maintained post construction.

**TABLE 1.2-2**
**TEMPORARY AND PERMANENT ACCESS ROADS FOR THE J-2 LOOP PROJECT**

| Access Road Number | Milepost | New or Existing | Temporary or Permanent | Area (acres) | Description |
|---|---|---|---|---|---|
| 1 | 0.15 | Existing | Temporary | 0.24 | Existing Driveway |
| 2 | 0.22 | Existing | Temporary | 0.24 | Existing Driveway |
| 3 | 0.29 | Existing | Temporary | 0.33 | Existing Private Rd |
| 4 | 0.45 | Existing | Temporary | 0.83 | Existing Private Rd |
| **Total** | | | | **1.64** | - |

**TABLE 1.2-3**
**LAND REQUIREMENTS FOR ADDITIONAL TEMPORARY WORKSPACE (ATWS) / STAGING AREAS FOR THE J-2 LOOP PROJECT**

| Project Component | Number of ATWS / Staging areas | Land Affected During Construction (acres) | Land Affected During Operation (acres) |
|---|---|---|---|
| ATWS | 10 | 6.69 | 0.0 |
| Staging Areas | 3 | 2.91 | 0.0 |
| **Total** | **18** | **9.6** | **0.0** |

### 1.2.2 Aboveground / Ancillary Facilities

Aboveground/Ancillary facilities associated with the Project will include modification to the existing meter station at MP 0.0 and new valves located at MP 2.29. The modifications at MP 0.0 include the installation of a permanent pig launcher. The facilities at MP 2.29 are for the ability to install a temporary pig receiver as required for future in-line inspection work. Due to the congested location of MP 2.29, all installed permanent facilities will in a new vault below grade. Table 1.2-4 provides the land requirements for construction and operation of the aboveground/ancillary facilities associated with the Project. Appendix I provides preliminary site-specific plans for the aboveground/ancillary facilities at both locations.

**TABLE 1.2-4**
**LAND REQUIREMENTS FOR THE J-2 LOOP PROJECT ABOVEGROUND FACILITIES**

| Facility | Milepost | Property Size (acres) | Land Disturbed During Construction (acres) | Land Required for Operation (acres) | Comments |
|---|---|---|---|---|---|
| Meter Station<br>Pig Launcher | 0.0 | 0.27 | 0.04 | 0.04 | Existing meter station facility |
| Valve site<br>Pig Receiver | 2.29 | Roadway | 0.54 | 0.0 | Valves will be in a new underground vault in roadway area |
| **Total** | - | - | 0.58 | 0.04 | - |

### 1.2.3 Summary of Construction and Operation Land Requirements

The construction workspace (including ATWS and permanent ROW) for the proposed pipeline facilities will total approximately 36.79 acres, the majority of which will be temporary impacts associated with installation of the pipeline (See Table 1.2-1). Operation of the pipeline will require a minimal amount (0.33 acres) of new permanently maintained ROW as the majority of the proposed alignment is located within existing paved roadways and paved parking (See Table 1.2-1). The proposed aboveground / ancillary facilities will occupy approximately 0.04 acres. See Table 1.2-5 for a summary of all Project-related land requirements.

Given the densely developed and disturbed nature of the Project area, a significant portion of the J-2 Loop Project has been sited within existing roadways and paved parking areas. As a result, the development of new access roads will not be required. Resource Report 8 provides information on the proposed ATWS areas, staging areas and access roads. The photo-based alignment sheets in Appendix H depict the location and configuration of all temporary construction workspace and permanent easement areas required for the Project.

**TABLE 1.2-5**
**SUMMARY OF LAND REQUIREMENTS FOR THE J-2 LOOP PROJECT**

| Facility | Land Affected During Construction[a] (acres) | Land Affected During Operation[b] (acres) |
|---|---|---|
| Pipeline | 24.97 | 0.33 |
| Aboveground / Ancillary Facilities | 0.58 | 0.04 |
| Access Roads | 1.64 | 0.0 |
| Additional Temporary Workspace / Staging Areas | 9.60 | 0.0 |
| **Total** | **36.79** | **0.37** |

[a] Construction ROW is based on the extent of permanent, temporary and additional temporary workspace.
[b] Permanent ROW is based on the extent of the area that will be maintained post construction.

## 1.3 CONSTRUCTION PROCEDURES

### 1.3.1 Pipeline

Construction methods will be implemented on the Project in accordance with the conditions outlined in the FERC *Erosion Control, Revegetation and Maintenance Plan* ("Plan") and *Wetland and Waterbody Construction and Mitigation Procedures* ("Procedures") (January 2003 Versions) (See Appendix C) and Algonquin's Erosion and Sedimentation Control Plan ("E&SCP") (See Appendix D). Proposed deviations from the FERC *Plan and Procedures* are not anticipated.

Algonquin estimates a construction staff of approximately 50-75 contract personnel divided evenly into three construction spreads to be employed during construction. Construction will take place over a period of approximately 14 to 18 weeks from initial clearing to final restoration. No new permanent employment positions will be created for Project operations.

#### 1.3.1.1 Residential Areas

A number of the roadways in which the new pipeline will be installed are predominately characterized by high-density multi-family residential areas. Prior to the installation of pipeline looping, Algonquin will co-ordinate with the applicable municipal agencies to provide police details to minimize impacts to residents and traffic to the greatest extent practicable.

#### 1.3.1.2 Roadways/Roadside Shoulders/Paved Parking Areas

The majority of the J-2 Loop Project has been sited within existing roadways, roadside shoulders, and paved parking areas in Somerville and Medford. The impervious locations will be open-cut to install the new pipeline. Prior to construction, the "Dig Safe" system and the local Departments of Public Works within both affected municipalities will be contacted to verify and mark all utilities along the Project workspace areas. Field instrumentation and test pits will be employed wherever there is a question as to the location of utilities such as water, cable, gas and sewer lines.

Due to construction of the pipeline within high-traffic areas, the stove-pipe construction technique may be implemented to minimize the amount of open trench and length of the pipeline string. The stove-pipe construction technique generally involves installing one or two joints of pipe at a time. The pipeline ditch is excavated just ahead of construction. One or two joints of pipe are carried into place, lowered into the ditch, and welded. The trench is backfilled on a daily basis. Often, the last section of newly installed pipe is not buried, but is covered with steel plates.

### 1.3.2 Aboveground / Ancillary Facilities

The proposed valve site and modifications at the existing meter station will be constructed in accordance with industry standards. Preliminary plans are provided within Appendix I that detail the proposed facilities. The facilities at the meter station include a permanent pig launcher located above ground. The facilities at the Project terminus (i.e., valves to allow the ability to install a temporary pig receiver as well as to connect to the existing NSTAR pipeline) will be installed below grade in a new concrete vault. The duration of construction for the ancillary facilities and the terminus facilities is approximately one month. Approximately 15-25 workers will be required for construction of this work.

### 1.3.3 Timeframe for Construction

Algonquin plans to commence construction of the Project in May of 2009, and the target in-service date is September 1, 2009. Currently, it is anticipated that one contractor will be assigned to both the pipeline and aboveground / ancillary facilities for the Project.

### 1.3.4 Environmental Training for Construction

As required by FERC, environmental training will be given to both company and contractor personnel involved with pipeline construction. The level of training will be commensurate with the type of duties of the personnel. All construction personnel from the chief inspector, environmental inspector, craft inspectors and contractor's superintendent to welders, loggers, equipment operators, and laborers will be given environmental training commensurate with their environmental responsibilities. The training will be given prior to the start of construction and throughout the construction process, as needed. The training program will cover the FERC *Plan and Procedures*, Algonquin's E&SCP, job-specific permit conditions, company policies, cultural resource procedures, and any other pertinent information related to the job. In addition to the environmental inspector(s), all other construction personnel will serve an important role in maintaining strict compliance with all permit conditions to protect the environment during construction.

## 1.4 OPERATION AND MAINTENANCE PROCEDURES

Algonquin will operate and maintain the newly constructed pipeline in the same manner as it currently operates and maintains its major interstate pipeline facilities in the Northeast and in accordance with the requirements of the United States Department of Transportation ("DOT"). The pipeline will be patrolled on a routine basis, and personnel qualified to perform both emergency and routine maintenance on interstate pipeline facilities will handle the maintenance activities.

The proposed facilities will be operated and maintained in a manner such that pipeline integrity is maintained in the interest of assuring that a safe, continuous supply of natural gas reaches its delivery point. Maintenance activities will include regularly scheduled gas-leak surveys emergency repair, and the review for other construction activities in the vicinity of the pipeline. All fence posts, signs, marker posts, aerial markers and decals will be painted or replaced to ensure that the pipeline locations will be visible from the air and ground.

The pipeline will be patrolled from the air on a periodic basis. This will provide information on possible leaks, construction activities, erosion, exposed pipe, population density, possible encroachment and any other potential problems that may affect the safety and operation of the pipeline. In addition, Algonquin is a participant in the "Dig Safe" system for utility companies in Massachusetts. Under the "Dig Safe" system, anyone planning excavation activities may call a single number to alert all utility companies. Representatives of the utility companies that might be affected then visit the site and mark their facilities so that the excavation can proceed with relative certainty as to the location of all underground lines. Because the proposed Project has been sited nearly entirely within existing roadways, additional maintenance activities will be minimal and will include maintenance of a supply of emergency pipe, leak repair clamps, sleeves and other equipment needed for repair activities.

Cathodic protection of the pipeline will be conducted through existing rectifiers and ground beds. Test stations will be installed at various locations along the pipeline to gather accurate information for potential adjustments to the electrical current. The cathodic protection system will be regularly monitored to maintain required pipe-to-soil potential and will be achieved in accordance with the specifications set forth by Algonquin that meet or exceed DOT regulations.

The Project will not require any additional permanent staff or new operations offices or district offices for operation.

## 1.5 FUTURE PLANS AND ABANDONMENT

### 1.5.1 Future Plans

Algonquin has not identified any current or reasonably foreseeable plans for future expansion of the facilities proposed in this docket. To the extent that expansion of facilities may be required due to additional demand for natural gas service, this expansion could involve other pipeline segments not proposed in this docket. Any new facilities would be designed to be compatible with existing or proposed facilities.

### 1.5.2 Abandonment

Algonquin is not planning to abandon any facilities in association with the Project.

## 1.6 PERMITS AND APPROVALS

Construction contractors employed by Algonquin will be required to observe and comply with all federal, state, local laws, and ordinances and regulations that apply to the conduct of the work. During the performance of work, contractors will comply with the Minimum Federal Safety Standards adopted by the DOT under the Natural Gas Pipeline Safety Act of 1968, as amended, as well as Algonquin's standards.

Algonquin will obtain all necessary permits, licenses and clearances relating to the placement of the pipeline across or under roads, drainage facilities, waterbodies, wetlands and through any other sites or places that a governmental license or permit may be required (See Tables 1.6-1 and 1.6-2 and Appendix B). Additionally, Algonquin will acquire all applicable permits relative to the construction and operation of the proposed aboveground / ancillary facilities. Algonquin will include copies of all relevant environmental permits and approvals in the construction bid packages and contracts. The contractor will be required to be familiar with all permits and licenses obtained by Algonquin. The contractor will be required to comply with all the requirements related to the construction of the pipeline and related facilities and to the restoration of any areas disturbed by the construction of the pipeline.

### TABLE 1.6-1
### INFORMATION ON FEDERAL, STATE AND LOCAL APPROVALS FOR THE J-2 LOOP PROJECT

| Permit | Issuing Agency | Status |
|---|---|---|
| **Federal** | | |
| Certificate of Public Convenience and Necessity | Federal Energy Regulatory Commission | To be filed April 2008 |
| Clearance | U. S. Fish and Wildlife Service | Received 11/21/07 and 3/27/08 |
| Consistency | MA Coastal Zone Management Agency | Received 3/10/08 |
| NPDES – Hydrostatic Test Water Discharge | U. S. Environmental Protection Agency | To be filed 3rd Quarter 2008 |
| **Massachusetts State** | | |
| Clearance | MA Historical Commission (SHPO) | Survey Reports Submitted on April 21, 2008 |
| Clearance | MA Natural Heritage & Endangered Species Program | Received 11/12/07 and 3/17/08 |
| Road Occupation / Opening Permit | MA Highway Department<br>MA Department of Conservation and Recreation | To be filed 4th Quarter 2008 |
| **Local and County** | | |
| Order of Conditions<br>MGL 131, Section 40<br>Local Wetland Bylaws | Medford Conservation Commission | To be filed 2nd Quarter 2008 |
| Road Crossing / Occupation Permits | Local Departments of Public Works | To be filed 3rd Quarter 2008 |

## TABLE 1.6-2
## AGENCY CORRESPONDENCES AND RESPONSES FOR THE J-2 LOOP PROJECT

| AGENCY | DATE SENT | REQUEST | DATE RECEIVED | COMMENT |
|---|---|---|---|---|
| U. S. Fish & Wildlife Service<br>New England Field Office<br>Attn: Anthony Tur<br>70 Commercial St. Ste. 300<br>Concord, NH 03301-5087<br>(603) 223-2541 | 10/18/07 | *Threatened and Endangered Species Consultation Request* | 11/21/07 | No threatened or endangered species or critical habitat known to occur within Project area |
| | 2/22/08 | | 3/27/08 | |
| Massachusetts Department. of Conservation & Recreation<br>Attn: Mr. Karst Hoogeboom<br>251 Causeway Street – Suite 600<br>Boston, MA 02114<br>(617) 626-1350 | 10/18/07 | *Natural, Recreational and Scenic Areas Consultation Request* | | |
| | 2/22/08 | | | |
| U.S. Environmental Protection Agency, Region 1<br>Attn.: Timothy Timmermann<br>CMA 1 Congress St. Ste. 1100<br>Boston, MA 02114<br>(617) 918-1578 | 10/18/07 | *Sole Source Aquifer Consultation Request* | 10/23/07 | No Sole Source Aquifer within 0.25-miles of Project area |
| | 2/22/08 | | 3/31/08 | |

## TABLE 1.6-2
## AGENCY CORRESPONDENCES AND RESPONSES FOR THE J-2 LOOP PROJECT

| AGENCY | DATE SENT | REQUEST | DATE RECEIVED | COMMENT |
|---|---|---|---|---|
| Massachusetts Division of Marine Fisheries<br>Attn: Tay Evans<br>30 Emerson Avenue<br>Gloucester, MA 01930<br>(508) 389-6300 | 10/18/07 | *Fisheries of Concern Consultation Request* | 10/23/07 | No fisheries resource concerns associated with the Project |
| | 4/1/08 | | 4/1/08 | No in water work conducted between April 1 and June 30 of any year |
| NOAA Fisheries<br>Northeast Regional Office<br>1 Blackburn Drive<br>Gloucester MA 01930 | 2/22/08 | *Fisheries resources of special concern* | 4/1/08 | Concurs with Massachusetts Division of Marine Fisheries |
| Natural Heritage & Endangered Species Program<br>Attn: Ms. Kristen Black<br>Route 135<br>Westborough, MA 01581-3337<br>(508) 792-7270 ext. 200 | 10/18/07 | *State Threatened and Endangered Species Consultation Request* | 11/12/07 | No Priority or Estimated Habitat or rare species concerns within the Project area |
| | 2/21/08 | | 3/17/08 | |
| U. S. National Park Service<br>Attn: Mr. David Clark<br>15 State Street<br>Boston, MA 02109<br>(617) 223-5141 | 10/18/07 | *National Landmarks & Wild and Scenic Rivers Consultation Request* | 11/9/07 | No Resources within 0.25 miles of Project |

## TABLE 1.6-2
## AGENCY CORRESPONDENCES AND RESPONSES FOR THE J-2 LOOP PROJECT

| AGENCY | DATE SENT | REQUEST | DATE RECEIVED | COMMENT |
|---|---|---|---|---|
| Office of Coastal Zone Management<br>Attn: Mr. Robert L. Boeri<br>251 Causeaway Street, Suite 800<br>Boston, MA 02114<br>(617) 626 – 1200 | 10/18/07 | *Coastal Boundary Request* | 10/29/07 | The activities associated with the Project fall outside the geographical boundaries of the Massachusetts Coastal Zone |
| | 2/22/08 | | 3/10/08 | |
| MA DEP<br>Northeast Regional Office<br>Bureau of Waste Site Cleanup<br>Attn: Steve Johnson<br>205B Lowell Street<br>Wilmington, MA 01887<br>(978) 694-3200 | 10/18/07 | *Request for listing of contaminated sites in or within 0.25-miles of proposed Project* | 10/23/07 | Unable to conduct necessary research – suggested on-line research of waste sites |
| | 2/22/08 | | 2/28/08 | |
| Massachusetts Executive Office of Environmental Affairs<br>Office of the State Geologist<br>Attn: Stephen B. Mabee<br>611 North Pleasant Street<br>Amherst, MA 01003 | 10/18/07 | *Geologically sensitive areas in or within 0.25 miles of the proposed Project* | 11/1/07 | Blue Clay susceptible to soils liquefaction, slumping and sloughing under the right conditions |
| | 2/22/08 | | | |

### TABLE 1.6-2
### AGENCY CORRESPONDENCES AND RESPONSES FOR THE J-2 LOOP PROJECT

| AGENCY | DATE SENT | REQUEST | DATE RECEIVED | COMMENT |
|---|---|---|---|---|
| Massachusetts Water Resources Authority<br>Jeff McLaughlin<br>Charlestown Navy Yard<br>100 First Avenue, Building 39<br>Charlestown, MA 02129<br>(617) 660-7976 | 10/18/07 | *Water supply systems* | | |
| | 2/22/08 | | | |
| City of Medford<br>Office of Community Development<br>Attn: Lauren DiLorenzo<br>85 George P. Hassett Drive<br>Medford, MA 02115<br>(781) 393 – 2480 | 10/18/07 | *Planned developments within 0.25 miles of Project area* | Not dated | Referred to Building Department |
| City of Medford Building Department<br>Att: Paul Mochi<br>85 George P. Hassett Drive<br>Medford, MA 02115 | 4/1/08 | | 4/2/08 | One planned commercial building at 257 Mystic Avenue |
| City of Medford<br>Board of Health<br>Karen L. Rose<br>15 George P. Hassett Drive<br>Medford, MA 02155 | 10/18/07 | *Municipal designated aquifers, surface waters that provide drinking water supplies, municipal designated surface water protection areas, any known existing or proposed public or private drinking water wells or springs within 300 feet of the proposed alignment* | 4/7/08 | No Potable Drinking Wells are to be used for Drinking Water in Medford, MA |

**TABLE 1.6-2**
**AGENCY CORRESPONDENCES AND RESPONSES**
**FOR THE J-2 LOOP PROJECT**

| AGENCY | DATE SENT | REQUEST | DATE RECEIVED | COMMENT |
|---|---|---|---|---|
| City of Medford Water and Sewer Department<br>Attn: Mr. Davis Proctor<br>52 Swan Street<br>Medford, MA 02155 | 10/18/07 | *Municipal sewer systems in or within 0.25 miles of proposed Project* | | |
| Somerville Health Department<br>Attn: Noreen Burke<br>City Hall Annex<br>50 Evergreen Avenue<br>Somerville, MA 02143 | 10/18/07 | *Municipal designated aquifers, surface waters that provide drinking water supplies, municipal designated surface water protection areas, any known existing or proposed public or private drinking water wells or springs within 300 feet of the proposed alignment* | | |
| | 2/25/08 | | | |
| City of Somerville<br>Water and Sewer Enterprise<br>Attn: Carol Antonelli<br>17 Franey Road<br>Somerville, MA 02143 | 10/18/07 | *Any known existing or proposed public or private drinking wells or springs within 300 feet of the proposed alignment; municipal sewer systems* | | |
| | 2/25/08 | | 4/3/08<br>City Engineer | MWRA supplies Somerville with water. The City does not utilize or own any aquifers, surface water or below ground wells. |

## 1.7 NONJURISDICTIONAL FACILITIES

There are no non-jurisdictional facilities associated with the Project.

## 1.8 LANDOWNER INFORMATION

Appendix J contains a listing of affected landowners including map and lot numbers and addresses. The Project alignment sheets (Appendix H) depict the property boundaries of each affected parcel and identify the names of the property owners of record according to a specified line list. Algonquin obtained landowner permission to conduct engineering and environmental surveys on all properties crossed by the proposed alignment. Algonquin certifies that all affected property owners, towns, communities and local, state and federal governmental agencies will be notified via first-class mail or hand-delivered within three (3) business days of the date FERC issues a notice of the application in accordance with 18 CFR 157.6(d). Additionally, copies of the ER will be distributed to libraries within the affected municipalities and public notice will be made within newspapers of general circulation upon the issuance of a notice of application by FERC (See Table 1.8-1).

Prior to the submission of its application, Algonquin implemented a comprehensive stakeholder outreach strategy in an effort to identify and potentially resolve issues raised by stakeholders with regard to its Project. Because Algonquin prides itself on its solid track record of safe and environmentally responsible operations, Project team members reached out to public and governmental stakeholders as the Project scope evolved in order to solicit their input to help inform facility design beyond the requirements of the marketplace. To that end, Algonquin began meeting with governmental stakeholders in advance of landowner notification starting in the fall of 2007, well in advance of the submission of this application.

Recognizing that the Project's stakeholder outreach program will need to continue well beyond the conclusion of the Project's construction activities, key components of the strategy have included:

- Timely notification to state and municipal officials, and state legislative and congressional delegation members in advance of notification to affected landowners in order to ensure that all parties have access to Project information in a timely fashion;
- Active coordination among all specialties within the Project team to facilitate information exchange and dissemination to interested stakeholders; and
- Ongoing communication with interested parties as initial facility designs were reviewed based on the response to stakeholder feedback.

As the facility designs have changed, Algonquin has utilized the aforementioned components of its outreach strategy at each critical juncture in anticipation of the submission of this application.

**TABLE 1.8-1**
**LIBRARIES AND NEWSPAPERS WITHIN THE J-2 LOOP PROJECT AREA**

| | |
|---|---|
| **Libraries** | |
| NAME | Somerville Public Library |
| ADDRESS | 79 Highland Avenue, Somerville, MA 02143 |
| NAME | Medford Public Library |
| ADDRESS | 111 High Street, Medford, MA 02155 |
| **Newspapers** | |
| NAME | The Boston Globe |
| ADDRESS | 135 William T. Morrissey Boulevard<br>Dorchester, MA 02125 |
| NAME | Somerville Journal |
| ADDRESS | 20-40 Holland Street<br>Somerville MA 02144 |
| NAME | Medford Transcript |
| ADDRESS | 57 High Street, Medford, MA 02155 |

### 1.8.1 Systematic Stakeholder Outreach

***State, Local, and Congressional Officials***

Prior to notifying affected landowners along the pipeline route, the Land and Government Relations specialists on the Algonquin Project team met with state and municipal officials, state legislative delegation members, and congressional representatives and/or members of their staff to apprise them of the Project (See Table 1.8-2). In conjunction with those meetings, Algonquin prepared preliminary maps and a Project overview that outlined Project need, the proposed facilities and the anticipated timing of the permit applications. Algonquin representatives solicited their input and attempted to use that feedback as facility designs evolved. The benefit of this early dialogue enabled the Project to anticipate issues and incorporate the appropriate response into its stakeholder outreach efforts.

Finally, because local, state and federal government officials are both a touchstone for their constituents and powerful advocates for their concerns, the Project felt it critical to time its notifications to precede written notification to affected landowners. It has also been invaluable to have had the opportunity to brief the staff members to the aforementioned officials in addition to the elected members as they are often the first point of contact for concerned landowners when they seek answers. Generally speaking, these staff members have also appreciated the advance notice in anticipation of possible phone calls or emails to their offices.

***State and Federal Regulatory Agencies***

Algonquin's Project team has endeavored to reach out to Massachusetts and federal regulatory agencies from the outset as identified in Table 1.8.2. Meetings took place as early as October 2007. Just as input from impacted landowners and elected officials has been maximized to begin to inform facility design, the feedback received by representatives of regulatory agencies has also been invaluable. As with all outreach activities, the Project's overarching goal is to submit the most thoughtful and comprehensive application possible that achieves the Project's purpose, minimizes the overall impacts and reflects the input received to date.

### 1.8.2 Impacted Landowner Outreach

Letters were mailed to affected landowners to describe the Project and to provide information about their rights under the FERC process. Each letter contained a description of the overall Project and an indication that their property might be impacted during construction. In addition, letters contained the toll-free Project telephone number (800-470-9333) and a general description of what landowners should expect from Algonquin, in terms of future survey requests and survey activities.

### 1.8.3 Website

A Project website will be launched in conjunction with the submission of this application. In addition to the toll-free telephone number, the website will be referenced in all future communications related to the Project. Generally, the website will contain a Project description, an introduction to FERC's processes, and a Project timetable. It will also contain hyperlinks to Algonquin's application and to the PDF version of FERC's informational brochure entitled, "*An Interstate Natural Gas Facility on My Land? What do I need to Know*." As the Project advances, notices of opportunities for public comment will be posted as well as news articles and other timely information resources. Finally photographs depicting construction activities as they proceed will be posted on the Website.

### 1.8.4 Informational Open Houses

In an effort to provide timely Project information to landowners, public officials and the general public, the Project conducted informational Open Houses in Somerville and Medford on April 14 and 16, 2008, respectively. All public officials who were briefed initially and all affected landowners were invited to attend specific Open Houses based on their geographic location. The Open Houses were moderately well-attended and a representative from each discipline within the Project team was on-hand to answer questions. It was made clear from the outset that these Open Houses were designed to be informational in nature. The informal Open Houses were invaluable for team members in attendance because they were able to field important landowner questions about the right-of-way, concerns related to the impact from construction activities, and other Project questions.

The format used for the Open Houses held was as follows:

a. Open Houses featured an overview of the Project, mounted aerial and topographical maps, and the availability of team members from each discipline: environmental, engineering, construction, public and government relations, right of way and legal;

b. Open Houses were conducted in the early evening and sign-up sheets and follow-up sheets related to individual landowner inquiries were utilized;

c. Handouts were available containing a Project overview and timelines, tables of necessary permits, team contact information, and reference to the FERC process with FERC contact information;

d. Copies of FERC's guide entitled, "*An Interstate Natural Gas Facility on My Land? What do I need to Know?*";

e. Information about pipeline safety and environmental mitigation measures; and

f. Detailed Project corridor maps on display.

### 1.8.5 FERC Site Visits and Scoping Meetings

Should FERC decide to conduct a site visit in Massachusetts, public officials and impacted landowners will be notified in writing in advance of FERC staff's site visits. The letters will also contain general descriptions of the purpose of the site visit as constituting an integral part of FERC's deliberative process. As always, Project team members will be on-hand to provide information. A scoping session could also take place in the evening and the same interested parties will be notified of their opportunities to offer comments concerning the Project.

### 1.8.4 Algonquin's Public and Government Relations Team

Algonquin will draw from its internal resources to ensure that all public and government relations activities are managed in a timely and comprehensive measure that will continue throughout the life of the Project.

## TABLE 1.8-2
## STAKEHOLDER CONTACT LIST

| Name | Organization | Nature of Contact |
|---|---|---|
| W. Robert Keating - Commissioner | Massachusetts Department of Public Utilities | Meeting |
| Jolette Westbrook - Executive Director | Massachusetts Energy Facilities Siting Board | Meeting |
| Selma Urman | Massachusetts Energy Facilities Siting Board | Meeting |
| William Febiger | Massachusetts Energy Facilities Siting Board | Meeting |
| Michael Capuano | Congressman | Letter |
| Edward Markey | Congressman | Letter |
| Patricia Jehlen | State Senator | Meetings |
| Anthony Galluccio | State Senator | Meetings |
| Denise Provost | State Representative | Meetings |
| Carl Sciortino, Jr. | State Representative | Meetings |
| Timothy Toomey, Jr. | State Representative | Meetings |
| Edward Finn - City Clerk | City of Medford | Letter |
| Lauren DiLorenzo - Director | Planning & Community Development Department, City of Medford | Letter |
| Leo Sacco, Jr. – Chief | Medford Police Department | Letter |
| Frank Giliberti – Chief | Medford Fire Department | Letter |
| Paul Gere – Commissioner | Department of Public Works, City of Medford | Letter |
| Joseph Curtatone – Mayor | City of Somerville | Meetings |
| Dennis Sullivan – President | Board of Aldermen, City of Somerville | Letter |
| Steven Winslow – Chair | Conservation Commission, City of Somerville | Letter |
| John Long - City Clerk | City of Somerville | Letter |
| Stanley Koty - Commissioner | Public Works Department, City of Somerville | Meetings |

## TABLE 1.8-2
## STAKEHOLDER CONTACT LIST

| Name | Organization | Nature of Contact |
|---|---|---|
| Frank Wright - Assistant City Solicitor | City of Somerville | Meetings |
| Anthony Halloway – Chief | Somerville Police Department | Letter |
| Kevin Kelleher – Chief | Somerville Fire Department | Letter |
| Charles E. O'Brien - City Engineer | City of Somerville | Meetings |
| Rick Willette - Director of Operations | Department of Public Works, City of Somerville | Meetings |
| Lesley Hawkins - Public Information Officer | Office of the Mayor, City of Somerville | Meeting |
| Paul Stedman | MA Highway | Meetings |
| Stephen M. Woelfel - Manager of Statewide Transit Planning | Executive Office of Transportation | Meeting |
| Joseph Cosgrove - Director of Development/Planning | Massachusetts Bay Transportation Authority | Meeting |
| Robert W. LaVita - Acquisitions Project Manager | Transit Realty Associates | Meeting |
| Michael McGlynn – Mayor | City of Medford | Meetings |
| Stephanie Muccini Burke - President | Medford City Council | Letter; Meeting |
| Jennifer Brust – Chair | Medford Conservation Commission | Letter |
| Patricia Barry – Agent | Medford Conservation Commission | Letter |
| Walter Pero - Ward 4 Alderman | Board of Aldermen, City of Somerville | Meeting |
| John Gannon - City Solicitor | City of Somerville | Letters |
| Thomas Graney | Department of Homeland Security, City of Somerville | Meeting |

Spectra Energy

# ALGONQUIN GAS TRANSMISSION, LLC

## J-2 LOOP PROJECT

### *Resource Report 2*

### *Water Use and Quality*

# RESOURCE REPORT 2 – WATER USE AND QUALITY FERC ENVIRONMENTAL CHECKLIST

| Part 380 – Minimum Filing Requirements for Environmental Reports | Company Compliance or Inapplicability of Requirement |
|---|---|
| Identify all perennial surface waterbodies crossed by the proposed Project and their water quality classification. (§ 380.12 (d)(1)). | Section 2.2 |
| Identify all waterbody crossings that may have contaminated waters or sediments. (§ 380.12 (d)(1)). | Section 2.2.1 |
| Identify watershed areas, designated surface water protection areas, and sensitive waterbodies crossed by the Project. (§ 380.12 (d)(1)). | Sections 2.1, 2.2.2, 2.2.5 |
| Provide a table (based on National Wetlands Inventory (NWI) maps if delineations have not been done) identifying all wetlands, by milepost and length, crossed by the Project (including abandoned pipeline), and the total acreage and acreage of each wetland type that would be affected by construction. (§ 380.12 (d)(1 and 4)). | N/A |
| Discuss construction and restoration methods proposed for crossing wetlands, and compare them to staff's Wetland and Waterbody Construction and Mitigation Procedures. (§ 380.12 (d)(2)). | 2.3.2 |
| Describe the proposed waterbody construction, impact mitigation, and restoration methods used to cross surface waters and compare to staff's Wetland and Waterbody Construction and Mitigation Procedures. (§ 380.12 (d)(2)). | N/A |
| Provide original NWI maps or the appropriate state wetland maps, if NWI maps are not available, that show all proposed facilities and include milepost locations for proposed pipeline routes (§ 380.12 (d)(4)). | Appendix G |
| Identify all U. S. Environmental Protection Agency (EPA) or state designated aquifers crossed (§ 380.12 (d)(9)). | Section 2.1 |

# TABLE OF CONTENTS

2.0 WATER USE AND QUALITY ........ 1
2.1 GROUND WATER RESOURCES ........ 1
2.1.5 Public and Private Water Supply Wells ........ 5
2.1.6 Groundwater Impact Mitigation ........ 5
2.2 SURFACE WATER RESOURCES ........ 5
2.2.1 Contaminated Sediments ........ 6
2.2.2 Public Watershed Areas ........ 6
2.2.3 Hydrostatic Test Water ........ 6
2.2.4 Construction Permits ........ 6
2.2.5 Sensitive Surface Waters ........ 6
2.2.6 Construction-Related Impacts ........ 7
2.2.7 Waterbody Construction and Mitigation Procedures ........ 7
2.3 WETLANDS ........ 7
2.3.1 Existing Resources ........ 7
2.3.2 Construction and Operation Impacts ........ 8
2.4 LITERATURE CITED ........ 8

# LIST OF TABLES

2.1-1 Database Listings with the Potential to Impact the J-2 Loop Project....4
2.2-1 Potential Sources of Hydrostatic Test Waters for the J-2 Loop Project....6

# LIST OF FIGURES

Please Refer to Appendix A

2.1-1 Algonquin J-2 Loop Project – Groundwater Resources
2.1-2 Algonquin J-2 Loop Project – Federal and State-Identified Hazardous Waste Locations
2.1-3 Algonquin J-2 Loop Project – DEP Wetlands and Hydrography
2.1-4 Algonquin J-2 Loop Project – FEMA Flood Zones

# 2.0 WATER USE AND QUALITY

This resource report provides information on groundwater and surface water resources in the vicinity of the Project including wetlands and waterbodies, as well as construction-related water use. Section 2.1 describes groundwater availability, quality and current uses. Section 2.2 describes surface water availability, quantity, current uses, potential use during construction, and construction methodologies to be utilized in the vicinity of surface waters. Section 2.3 describes wetland resources within the Project area (including location by milepost, USFWS classification, and surface area affected during construction and operation), anticipated construction and operation impacts, and proposed impact mitigation and minimization measures. Section 2.4 provides a list of references utilized during preparation of this resource report. On behalf of Algonquin, ENSR determined the nature and location of wetlands, surface waters, springs, wells, groundwater hazards and point and non-point pollution sources by consulting appropriate agencies, performing field investigations and conducting background research.

## 2.1 GROUND WATER RESOURCES

The J-2 Loop Project includes the installation of approximately two miles of new 14-inch OD natural gas loop pipeline in the cities of Medford and Somerville, MA. The cities of Medford and Somerville are urban areas within the greater Boston metropolitan area that are characterized by densely settled, developed and disturbed areas. Therefore, groundwater resources within the Project area are not prevalent.

Medford and Somerville are part of the Mystic River watershed, which is a sub watershed of the Boston Harbor watershed. The Mystic River watershed is the most densely populated and urbanized watershed in Massachusetts and is further divided into nine sub-basins. Medford and Somerville are within the Alewife Brook and Mystic River 1 sub-basins. Additionally, Somerville is part of the Mystic River 2 sub-basin, while Medford is within the Aberjona, Horn Pond, Mystic Lakes and Malden River sub-basins (Mystic River Watershed Association 2007).

### 2.1.1 Aquifers

The Mystic River watershed was formed by retreating glaciers more than 10,000 years ago, and the terrain is generally flat (Mystic River Watershed Association 2007). The principal aquifers in this watershed are composed of sand and gravel sediments that were deposited within stream channels throughout the last glacial period (USGS 2007a).

A review of the MassGIS datalayer and communications with the applicable federal, state, and municipal agencies revealed that groundwater protection zones including Massachusetts Department of Environmental Protection ("DEP") Wellhead Protection Areas, DEP Surface Water Protection Areas are neither crossed by the Project nor are any of these protection zones located within 250-feet of the Project area. Further, the Project alignment does not lay within a DEP designated aquifer (See Figure 2.1-1 in Appendix A) or within an EPA designated Sole Source Aquifer (Reiner 2007; Hill 2008).

### 2.1.2 Water Availability

The Massachusetts Water Resources Authority ("MWRA") has been created to supply clean water to local water departments in 48 communities in Massachusetts that include both Medford and Somerville. The Quabbin and Wachusett Reservoirs, which are located approximately 65 miles west of Boston and 35 miles west of Boston, respectively, are the primary sources of drinking water for these communities. The Quabbin Reservoir is one of the largest man-made public water supplies in the United States and is also one of the largest unfiltered water supplies in the world. When at its fullest, the reservoir has the capacity to hold 412 billion gallons of water, which is approximately a four year supply (MWRA 2006). The reservoirs, which are filled naturally, provided approximately 220 million gallons per day ("gpd") to residences, businesses, schools, etc. in 2004. The area surrounding the reservoirs is characterized by forest and wetlands (85%), and the Department of Conservation and Recreation ("DCR") monitors and protects both the reservoirs and surrounding areas. As a result, the water quality of the reservoirs is very high (MWRA 2007).

The water for Medford and Somerville is treated at the Carroll Water Treatment Plant in Marlborough, MA where the water is treated in four steps. The water then leaves the plant via the Metro West Water supply tunnel where it is stored in tanks before being drawn to large distribution mains and smaller pipes. Water meters log the amount of water entering the community and the water departments are charged accordingly (MWRA 2007).

### 2.1.3 Water Quality

The poor water quality of the Mystic River Watershed can be attributed to dense population and by historic activities. This watershed has been settled for hundreds of years and was first settled by Europeans in the 1600s. Throughout the 1800s, factories replaced many of the farms formerly present within the watershed, and the area has since become highly polluted as a result of industrial activities including waterpower to grind grain and spices, saw wood, process paints, as well as the presence of mills, brickyards and tanneries along the river (Mystic River Watershed Association 2007).

The Source Water Assessment and Protection ("SWAP") program was established under the federal Safe Drinking Water Act and requires the following protocols be implemented by every state:

- Inventory land uses within the recharge areas of all public water supply sources
- Assess the susceptibility of drinking water sources to contamination from these land uses
- Publicize the results to provide support for improved protection

The SWAP report for the MWRA indicated that, as of 2002, the MWRA has met the DEP's annual review of "Measures for Success" for implementation of Watershed Protection Plans and disinfection treatment processes (DEP 2002).

### 2.1.4 Groundwater Hazards

On behalf of Algonquin, ENSR conducted field and database research to identify, to the extent feasible, properties within 0.25 miles of the Project alignment with potential to impact the proposed workspace with oil and/or hazardous materials. ENSR obtained a federal and state database search report from Environmental Data Resources, Inc. for the area within 660 feet of the corridor segment. A total of 359 database listings were identified. In addition, approximately 200 "Orphan" sites were identified (EDR 2007). In ENSR's opinion, seven sites have the potential to impact the Project (see Table 2.1-1 below). A file review will be conducted at the MA DEP to further evaluate these sites, and subsurface material characterization will be completed prior to construction to identify any areas of impacted soil. Algonquin will dispose of or mitigate for any hazardous materials uncovered in accordance with the Massachusetts Contingency Plan and applicable federal regulations.

## TABLE 2.1-1
## DATABASE LISTINGS FOR KNOWN HAZARDOUS MATERIAL RELEASES WITHIN 500 FEET OF THE J-2 LOOP PROJECT CORRIDOR

| Site ID# | Site Name/ Address | Relevant Database | Contamination Issues | Comments |
|---|---|---|---|---|
| 12 | AMI Leasing<br>407 Mystic Avenue<br>Medford, MA | SHWS<br>Release | Lead Contamination listed in EDR report. There are likely other contaminants not listed in the database report. | Site in Phase IV, indicating that a remedial alternative is being implemented. |
| 12 | 407 Mystic Avenue<br>Medford, MA | SHWS<br>Release<br>MA Spills | 2.4 inches of petroleum based oils and 3 inches of diesel present. | Site was reported in April 2006 and has not been Tier Classified yet. |
| 23/24 | Former St. Polycarp Parish<br>100 Temple Street<br>Somerville, MA | Brownfields<br>SHWS<br>Release | Arsenic and TPH in soil. | Release is still open (classified as a Tier II site) and site status is listed as Phase II. |
| 29 | Intersection w/Jacques St.<br>65 Temple Street<br>Somerville, MA | SHWS<br>Release | Lead, TPH and PAHs in soil. | RAM completed and release closed with a Class A-2 RAO, indicating low concentrations of contaminants remain. |
| 39 | No Location Aid<br>324 and 338 Broadway<br>Somerville, MA | SHWS<br>LUST<br>Release (2) | Petroleum contamination. | IRA completed and releases are closed with a Class A-2 RAO, indicating low concentrations of contaminants remain. |
| 70 | Parking Lot<br>358 and 360 Medford St.<br>Somerville, MA | SHWS(2)<br>Release(3)<br>LUST<br>UST | Diesel fuel and gasoline contamination. | Releases were closed with Class A-2 RAOs, indicating low concentrations of contaminants remain. |
| 73 | No Location Aid<br>360 Medford Street<br>Somerville, MA | SHWS<br>Release<br>LUST<br>UST | Petroleum contamination. | Site was closed with a Down-gradient Property Status (DPS) submittal. TPH contamination is still present, and originates from an off-site source. |

### 2.1.5 Public and Private Water Supply Wells

This section will identify all known public and private water supply wells, springs and wellhead protection areas located within 150 feet of construction work areas associated with the Project. This information was compiled through consultation with state and local agencies and private landowners.

No public or private water supply wells are located within 150 feet of the Project. No DEP Interim Wellhead Protection Areas ("IWPA") or DEP Approved Wellhead Protection Areas ("Zone IIs") have been identified in the vicinity of the proposed Project (MassGIS Regulated Areas Data 2005). With the exception of incidental use of water supplies associated with contractor work facilities, the Project will not require use of public and/or private water supply wells. Algonquin will implement mitigation measures as described in Section 2.1.6 to ensure the protection of identified groundwater resources.

### 2.1.6 Groundwater Impact Mitigation

The Project is not anticipated to impact groundwater quality and/or supply. Algonquin proposes to implement construction practices designed to reduce and/or mitigate potential impacts on groundwater during construction as detailed within FERC's *Plans and Procedures* (Appendix C) and Algonquin's E&SCP (Appendix D). Algonquin and its contractors will adhere to these practices related to groundwater protection including specifications for trench breakers and dewatering as well as restrictions on refueling and storage of hazardous substances.

All equipment used in construction of the pipeline will be refueled and lubricated within the designated construction workspace or staging area at a minimum distance of 100 feet from all wetlands, waterbodies and identified wells. Auxiliary fuel tanks will be used to reduce the frequency of refueling operations, and refueling will not take place within 400 feet of identified municipal or community water supplies including groundwater and surface water as per state requirements. The impact minimization measures will prevent the discharge of hydraulic fluids or fuels from leaving the ROW and / or leaching into the groundwater.

## 2.2 SURFACE WATER RESOURCES

The closest major surface water body to the Project corridor is the Mystic River at the northern end of the proposed Project. The Project corridor is located approximately 275 feet southwest of the Mystic River at its closest point. According to DEP Water Quality Classification, the Mystic River has a water quality classification of "B", designated as habitat for fish and other aquatic life, as well as wildlife and for primary and secondary recreation. Where designated by DEP, Class B waters shall serve as a suitable source of public water supply with the appropriate treatment. Further, Class B waters shall be suitable for irrigation and other agricultural uses as well as for industrial uses. Some portions of the Mystic River have been identified as B(CSO). This designation refers to waters that have been identified as impacted by the discharge of combined sewer overflows ("CSO"). Correspondence from the Massachusetts Division of Marine Fisheries stated that no in-water work be conducted between April 1 and June 20 of any year to protect the passage and spawning of Mystic River alewives (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*) (Evans 2008). No in-water work is proposed; therefore, no impacts to fisheries resources are anticipated as a result of construction or operation of the Project.

### 2.2.1 Contaminated Sediments

No waterbodies will be crossed by the Project, and therefore, contaminated sediments within waterbodies are not an issue of concern for the Project.

### 2.2.2 Public Watershed Areas

No public watershed or potable surface water supply areas are crossed by or in the vicinity of the Project (MassGIS 2005).

### 2.2.3 Hydrostatic Test Water

In compliance with U. S. Department of Transportation ("DOT") specifications, Algonquin will conduct hydrostatic testing of the pipeline prior to placement in service. Algonquin anticipates the use of water from the City of Somerville municipal system for hydrostatic pressure testing as identified in Table 2.2-2. Upon completion of the hydrostatic test, the hydrostatic test water will be discharged to an upland area within the identified temporary workspace to the east of the meter station (MP 0.00). Environmental impacts from withdrawal and discharge of test water will be minimized by utilizing the measures outlined in the FERC *Plan & Procedures* (Appendix C), Algonquin's E&SCP (Appendix D) and by complying with all applicable permit requirements.

**TABLE 2.2-1**
**POTENTIAL SOURCES OF HYDROSTATIC TEST WATER**
**FOR THE J-2 LOOP PROJECT**

| Facility | Potential Source | Approximate Milepost | Quantity of Water Required (gallons) |
|---|---|---|---|
| 14" diameter pipeline | Municipal Water System / MWRA | 0.00 | 71,500 |

### 2.2.4 Construction Permits

As listed in Resource Report 1, Table 1.6-1, Algonquin will obtain all necessary permits, approvals and licenses related to the withdrawal or discharge of hydrostatic test water, as necessary.

### 2.2.5 Sensitive Surface Waters

DEP considers surface waters sensitive (designated as Class A) if they provide a source of water supply for drinking or food processing purposes and are suitable for bathing and primary contact recreational purposes (DEP 2007). No waterbodies are crossed by the Project, and the Mystic River, which is in the vicinity of the Project, is not designated by MADEP as Class A water (DEP 2007) and is not part of the Federal Wild and Scenic Rivers System (Clark 2007).

Outstanding Resource Waters ("ORW"s) are waters, such as public water supplies and vernal pools, which are protected by the most stringent standards because they constitute an outstanding resource as determined by their socioeconomic, recreational, ecological, and/or aesthetic values (EOEA 2004). A review of the MassGIS ORW datalayer confirms that there are no ORWs along or within 150 feet of the Project corridor. There will be no permanent adverse impacts to sensitive waterbodies as none will be crossed by or are in the vicinity of the Project.

### 2.2.6 Construction-Related Impacts

There is a waterbody associated with Wetland 1. The majority of this waterbody is located outside of the construction workspace; however, the waterbody is conveyed through two culverts that extend under Mystic Avenue at approximate MP 0.21. Algonquin does not anticipate any impacts to this surface waterbody associated with the construction of the Project, as the pipeline will be installed either beneath or above the existing culverts.

### 2.2.7 Waterbody Construction and Mitigation Procedures

There are no direct waterbody crossings associated with the proposed pipeline installation.

## 2.3 WETLANDS

### 2.3.1 Existing Resources

On behalf of Algonquin, ENSR surveyed the Project area in November 2007 to identify, locate, classify, and delineate wetland resources in the Project area. A total of two wetland/drainage swales were identified in the vicinity of the construction corridor and their locations have been described below by MP. Neither wetland system will be directly impacted by the Project as they are located outside of any designated workspace areas.

*Wetland 1*

Wetland 1 is located near the existing meter station at MP 0.21. This linear feature is located north of Hicks Avenue and extends east under Mystic Avenue via two existing culverts. Flow within this drainage swale continues east under Interstate 93 ("I-93"), discharging to an inlet of the Mystic River. This wetland receives hydrology from multiple stormwater management outlets associated with the neighboring commercial properties. The identified wetland/drainage swale is confined to the culverts under Mystic Avenue. The pipeline will be installed either under or above the culverts, so there will be no direct affect on the system by construction or operation of the Project.

*Wetland 2*

Wetland 2 is located at MP 0.57, along the southbound shoulder of I-93 and continues west, paralleling the interchange ramp to the roadside shoulder of Mystic Avenue. This drainage feature is maintained as grassed road shoulder and receives hydrology from multiple catch basin outlets located along I-93, and within the abutting commercial development. Collected runoff drains south to an existing precast concrete headwall and culvert located north of the I-93 interchange ramp. The identified wetland/drainage swale is within 100-feet of the proposed Project corridor, but will not be directly affected by construction or operation of the Project.

### 2.3.2 Construction and Operation Impacts

Within the construction corridor, Wetland 1 is confined to the culverts associated with Mystic Avenue; therefore, no temporary impacts to Wetland 1 will result from construction or operation of the Project. Potential impacts to adjacent upland areas may consist of soil disturbance and loss of vegetation during construction. Upon completion of the Project, topsoil, contour elevations, and hydrologic patterns will be restored. Algonquin will comply with the applicable permit conditions issued by federal, state and local permitting agencies.

## 2.4 LITERATURE CITED

Clark, David. 2007. Telephone Correspondence between David Clark, National Park Service and John Zimmer, ENSR on November 2, 2007.

DEP. 2002. Surface Water Quality Standards. http://www.state.ma.us/dep/bwp/iww/files/314cmr4.htm

EDR Datamap Corridor Study. March 2007 and April 2008. Environmental Data Resources, Inc. Milford, CT. 1-800-352-0050. 103 pp.

Evans, N.T 2008. E-mail correspondence on April 1, 2008 between N.T. Evans, Massachusetts Division of Marine Fisheries, and John Zimmer, ENSR.

Executive Office of Environmental Affairs, Division of Watershed Management, Commonwealth of Massachusetts. 2004. Massachusetts Year 2004 Integrated List of Waters: Proposed listing of the condition of Massachusetts' waters pursuant to Sections 303(d) and 305(b) of the Clean Water Act. 123 pp.

Hill, Michael. 2008. E-mail correspondence on March 31, 2008 between Michael Hill, USEPA, and John Zimmer, ENSR.

Massachusetts Department of Environmental Protection. 2002. Massachusetts Water Resources Authority 2002 Source Water Assessment and Protection Program Report [Online WWW]. Available URL: http://www.mass.gov/dep/water/drinking/6000000.pdf. [Accessed August 2007].

MassGIS. 2007. Regulated Areas Data Layers. http://www.mass.gov/mgis/laylist.htm#reg Last updated March 14, 2007.

Massachusetts Water Resources Authority. 2006. Metropolitan Boston's Water System History. Website last updated August 9, 2006. http://www.mwra.state.ma.us/04water/html/wat.htm

Mystic River Watershed Association. 2007. Mystic Action Plan. http://www.mysticriver.org/publications/ActionPlan.html

National Park Service. 2005. Wild and Scenic River System. www.nps.gov/rivers.

Northeast Regional Climate Center. 2002. Comparative climatic data for the United States. September, 2003. http://www.nrcc.cornell.edu/ccd.html.

Reiner, Edward. 2007. Email correspondence on October 2007, between Edward Reiner, USEPA and John Zimmer, ENSR

United States Environmental Protection Agency. 2006. Sole Source Aquifers Fact Sheet. http://www.epa.gov/earth1r6/6wq/swp/ssa/factshee.htmWebsite Last Updated June 15, 2006.

United States Geological Survey (USGS). 2007a. Boston Harbor Drainage Basin – Surface Waters. http://ma.water.usgs.gov/basins/bostonhsfw.htm. Last modified January 31, 2007

United States Geological Survey (USGS). 2007b. Boston Harbor Drainage Basin.

Spectra Energy

# ALGONQUIN GAS TRANSMISSION, LLC

## J-2 LOOP PROJECT

### *Resource Report 3*

### *Fish, Wildlife and Vegetation*

# RESOURCE REPORT 3 – VEGETATION AND WILDLIFE FERC ENVIRONMENTAL CHECKLIST

| Part 380 – Minimum Filing Requirements for Environmental Reports | Company Compliance or Inapplicability of Requirement |
|---|---|
| Classify the fishery type of each surface waterbody that would be crossed, including fisheries of special concern. (§ 380.12 (e)(1)). | Sections 3.1.1 and 3.1.2 |
| Describe terrestrial and wetland wildlife and habitats that would be affected by the Project. (§ 380.12 (e)(2)). | Section 3.3.1 |
| Describe the major vegetative cover types that would be crossed and provide acreage of each vegetative cover type that would be affected by construction. (§ 380.12 (e)(3)). | Section 3.2 |
| Describe the effects of construction and operation procedures on the fishery resources and proposed mitigation measures. (§ 380.12 (e)(4)). | Sections 3.1.3 and 3.1.4 |
| Evaluate the potential for short-term, long-term, and permanent impact on the wildlife resources and state-listed endangered or threatened species caused by construction and operation of the Project and proposed mitigation measures. (§ 380.12 (e)(4)). | Sections 3.3.2 and 3.4.2 |
| Identify all federally listed or proposed endangered or threatened species that potentially occur in the vicinity of the Project and discuss the results of consultations with other agencies. (§ 380.12 (e)(5)). | Section 3.4 |
| Identify all federally listed essential fish habitat (EFH) that potentially occurs in the vicinity of the Project and the results of abbreviated consultations with the National Marine Fisheries Service (NMFS), and any resulting EFH assessments. (§ 380.12 (e)(6)). | Section 3.1.2 |
| Describe any significant biological resources that would be affected. Describe impact and any mitigation proposed to avoid or minimize that impact. (§ 380.12 (e) 4 and 7)). | Sections 3.1, 3.1.3, 3.2, 3.2.2, 3.3, 3.3.3, 3.4 and 3.4.2<br>Appendix G<br>Appendix D |

# TABLE OF CONTENTS

3.0 VEGETATION AND WILDLIFE ........ 1
  3.1 FISHERIES ........ 1
    3.1.2 Fisheries of Special Concern ........ 1
  3.2 VEGETATION ........ 1
    3.2.1 Existing Resources ........ 1
    3.2.2 Communities of Special Concern ........ 2
    3.2.3 Construction and Operation Impacts ........ 2
    3.2.4 Minimization of Impacts ........ 2
  3.3 WILDLIFE ........ 3
    3.3.1 Existing Resources ........ 3
    3.3.2 Construction and Operations Impacts ........ 4
  3.4 ENDANGERED AND THREATENED SPECIES ........ 5
    3.4.1 Existing Resources ........ 5
    3.4.2 Minimization of Impacts ........ 5
  3.5 LITERATURE CITED ........ 5

# LIST OF TABLES

3.3-1 Representative Wildlife Species in the Vicinity of the J-2 Loop Project ........ 4

# LIST OF FIGURES

Please Refer to Appendix A

3.3-1 Algonquin J-2 Loop Project - State Estimated and Priority Habitats of Rare Wildlife

3.3-2 Algonquin J-2 Loop Project – Areas of Critical Environmental Concern

# 3.0 VEGETATION AND WILDLIFE

Resource Report 3 describes the existing fish, wildlife and vegetation resources within the Project area, the potential impacts of construction and operation on these resources, and measures to reduce and mitigate these impacts. Section 3.1 describes the fishery resources and fish habitat of special concern. Section 3.2 describes wildlife resources, focusing on the habitat types traversed by the Project. Section 3.3 describes the vegetation types, including wetlands, currently found in the vicinity of the Project. Section 3.4 describes the occurrence of state and federally listed threatened and endangered species that have been reported in the vicinity of the Project. Section 3.5 provides a list of references.

## 3.1 FISHERIES

This section discusses fishery resources, fish species of special concern, and construction and operation impacts on the fisheries present in the streams crossed by the proposed pipeline. The Massachusetts Division of Fisheries and Wildlife ("MADFW") identified Mystic River populations of blueback herring (*Alosa aestivalis*) and alewives (*Alosa pseudoharengus*) as fisheries resources within the Project area (Evans 2008). Since no surface waterbodies will be crossed along the Project corridor, no construction or operation related adverse impacts on fisheries are anticipated.

### 3.1.2 Fisheries of Special Concern

Since no surface waterbodies will be crossed along the Project corridor, impacts to the above- mentioned fisheries resources are not anticipated. Additionally, the United States Fish and Wildlife Service ("USFWS") did not identify any federally-listed species of concern present within the Mystic River (TUR 2007 and 2008).

## 3.2 VEGETATION

### 3.2.1 Existing Resources

#### 3.2.1.1 Cover Type Descriptions

This section identifies and discusses the major vegetation cover types traversed by the Project. Existing terrestrial conditions were established through review of existing aerial photography and GIS data as well as through field surveys. The entire pipeline alignment is located within existing roadways, thereby minimizing alteration of previously undisturbed vegetation and avoiding impacts to residences. The general cover type consists of urban/roadway land.

The urban/roadway land cover type in the Project location includes: paved roadways/roadside shoulders, median strips, sidewalks, single and multi-family residences (high-density), and businesses (MassGIS). Urban parks in the area include the Mystic River Reservation, which provides minimal open space and public access along the Mystic River. The pipeline alignment will be located within the following paved roadways: the Mystic Valley Parkway, Mystic Avenue, Temple Street, Broadway, School Street, Medford Street, and the McGrath Highway (Route 28) / Conrail overpass.

### 3.2.2 Communities of Special Concern

Communities of special concern include sensitive or protected vegetation types, natural areas and unique plant communities. Algonquin has requested and obtained information regarding unique communities from the Massachusetts Natural Heritage and Endangered Species Program ("NHESP"). The NHESP indicated that the proposed Project alignment is not within any designated areas of priority or estimated habitat. The Project does not affect any certified or potential vernal pools, nor are any Areas of Critical Environmental Concern ("ACEC") within the vicinity of the Project area. Furthermore, the USFWS has not identified any federal communities of special concern within the Project area (Tur 2007 and 2008).

### 3.2.3 Construction and Operation Impacts

Successional habitats are not present within or in the vicinity of the Project corridor and therefore, a long-term impact to these areas is not a matter of concern associated with the proposed Project. Further, the alignment is sited within existing roadways. Temporary impacts to areas that are already vegetated such as median strips or lawns will be restored at the completion of construction activities.

### 3.2.4 Minimization of Impacts

The proposed pipeline alignment will be constructed primarily within existing roadways. The Project area is characterized by residential, commercial, and industrial developments, and the pipeline alignment does not contain any vegetated areas. Therefore, adverse impacts to vegetative areas are not anticipated as a result of the Project.

The proposed pipeline alignment will not cross or otherwise negatively impact the Mystic River Reservation. The pipeline alignment will extend along the southwestern portion of the Mystic River Reservation. All temporary workspace areas, however, shall be sited outside of the Reservation boundaries. Therefore, adverse impacts to the Mystic River Reservation resulting from construction and/or operation of the proposed Project are not anticipated. The pipeline alignment has been designed to utilize the existing roadway infrastructure to the maximum extent practicable, thereby minimizing adverse impact to the urban area.

#### 3.2.4.1 Cleanup/Restoration

All construction debris shall be removed following backfilling of the pipeline. Once backfilling is complete, Algonquin will restore disturbed areas in accordance with the FERC Plan, Algonquin's E&SCP and state and local requirements.

## 3.3 WILDLIFE

This section identifies and discusses the various wildlife species potentially present within the Project area. It also identifies unique or significant habitats such as wildlife refuges, national forests and wildlife management areas occurring within the Project area. A discussion of the existing habitat types to be crossed by the Project is presented in Section 3.3.1 with additional information provided on mammal, bird and reptile and amphibian species that utilize these habitats. Table 3.3-1 provides a list of representative species for the types of habitats described. Section 3.3.2 describes the short-term, long-term and permanent impacts to wildlife habitat anticipated from construction and operation of the Project as well as mitigation measures to avoid and minimize these potential impacts.

### 3.3.1 Existing Resources

The Project area is located within an urban setting, and due to the general lack of vegetation and habitat, wildlife abundance and diversity is low within the Project corridor.

#### 3.3.1.1 Mammals

Forty-four species of mammals have geographic ranges that include the eastern portion of Massachusetts (DeGraaf and Yamasaki 2001). These species include 24 species of rodents, seven species of bats, and larger species such as white-tailed deer (*Odocoileus virginianus*), eastern coyote (*Canis latrans*) and bobcat (*Felis rufus*). Given the urban nature of the Project area, the mammal species present within the Project area are limited to smaller species adapted to urban settings such as Norway rat (*Rattus norvegicus*), Eastern gray squirrel (*Sciurus carolinensis*), raccoon, and feral cats and dogs. Table 3.3.1 identifies typical mammal species that may be found within the Project area.

#### 3.3.1.2 Birds

Massachusetts possesses a diversity of avian species that utilize the variety of landforms, habitats and vegetative communities within the state. The proposed Project area is a highly developed urban area that does not contain significant habitat characteristics such as food sources, breeding, wintering, and escape cover for many bird species. Table 3.3-1 below presents a list of avian species that are likely to be encountered within the Project corridor.

#### 3.3.1.3 Reptiles and Amphibians

A total of 36 species of reptiles and amphibians are found within the northeastern half of Massachusetts. These include nine species of salamanders, seven species of turtles, 10 species of frogs, and 10 species of snakes (DeGraaf and Rudis 1981). Given the urban nature of the proposed Project area, suitable habitat that provides food sources, breeding, wintering, and escape cover for reptiles and amphibians is not present.

**TABLE 3.3-1**
**REPRESENTATIVE WILDLIFE SPECIES IN THE VICINITY OF THE J-2 LOOP PROJECT**

**MAMMALS**

| Common Name | Scientific Name |
|---|---|
| Norway Rat | *Rattus norvegicus* |
| House Mouse | *Mus musculus* |
| Gray Squirrel | *Sciurus carolinensis* |
| Striped Skunk | *Mephitis mephitis* |
| Feral Cat | *Felus catus* |
| Feral Dog | *Canis familiaris* |
| Raccoon | *Procyon lotor* |

**BIRDS**

| Common Name | Scientific Name |
|---|---|
| American Crow | *Corvus brachyrhynchos* |
| House Sparrow | *Passer domesticus* |
| European Starling | *Sturnus vulgaris* |
| Rock Dove | *Columba livia* |
| Common Grackle | *Quiscalus quiscula* |
| Herring Gull | *Larus argentatus* |
| Ring-billed Gull | *Larus delawarensis* |
| Greater Black-backed Gull | *Larus marinus* |

#### 3.3.1.4 Significant or Sensitive Species / Habitats

Consultation letters regarding significant or sensitive habitats were sent to USFWS and NHESP on October 18, 2007 and February 21, 2008. USFWS indicated that there are no federally listed or proposed threatened or endangered species under federal jurisdiction known to occur in the Project area (Tur 2007 and 2008). The NHESP also indicated that there are no state-protected species located within or immediately adjacent to the proposed pipeline alignment (French 2007 and 2008).

### 3.3.2 Construction and Operations Impacts

The proposed Project will require a total temporary disturbance (TWS, ATWS, and pipe storage yards) of approximately 33.21 acres. The entire Project area is located within previously disturbed areas. There are no significant wildlife populations that utilize the Project areas, and impacts to any wildlife species present within the Project area will be temporary in nature. Algonquin and its contractors will strive to minimize impacts to wildlife by expediting construction to the greatest extent possible.

## 3.4 ENDANGERED AND THREATENED SPECIES

This section identifies and discusses the potential presence of federal and state-listed plant and animal species potentially located within or in the vicinity of the Project area. It also identifies significant habitats, such as designated critical habitats and rare plant communities known to occur within or in the vicinity of the Project. Appendix B includes copies of the correspondence letters between Algonquin and the applicable regulatory agencies.

### 3.4.1 Existing Resources

#### 3.4.1.1 Federal Species

A Consultation letter regarding federally listed and proposed endangered or threatened species was sent to the U. S. Fish and Wildlife Service. The USFWS indicated that no federally listed or proposed threatened or endangered species under federal jurisdiction are known to occur in the Project area (Tur 2007 and 2008).

#### 3.4.1.2 State Species

The NHESP indicated that no state-protected species are present within the proposed Project alignment. NHESP further indicated that the proposed Project alignment is not within areas of priority or estimated habitat (French 2007 and 2008).

### 3.4.2 Minimization of Impacts

No federal or state-listed endangered or threatened species were identified within the Project area. Therefore, no Project-related impacts to rare species are anticipated.

## 3.5 LITERATURE CITED

Cardoza, J.E.; Jones, G.S.; French, T. W.; MassWildlife's State Mammal List. http://www.mass.gov/dfwele/dfw/dfwmam.htm Last updated May 19, 2006.

DeGraaf, R.M. and D.D. Rudis. 1981. Forest Habitat for Reptiles and Amphibians of the Northeast. USDA Northeastern Forest Experiment Station. General Technical Report NE-xxx. 239 pp.

DeGraaf, R. M., Yamasaki, M. 2001. New England Wildlife Habitat, Natural History, and Distribution.

Evans, T.N. 2008. E-mail correspondence on April 1, 2008 between N. Tay Evans, MA Division of Marine Fisheries and John Zimmer, ENSR.

French, Thomas W. 2007. November 12, 2007 Letter from Thomas W. French, MA Division of Fisheries and Wildlife to John Zimmer, ENSR.

French, Thomas W. 2008. March 17, 2008 Letter from Thomas W. French, MA Division of Fisheries and Wildife to John Zimmer, ENSR.

Friends of the Mystic River. 2007. http://www.fomr.org/.

Mystic River Watershed Association. 2007. Mystic Action Plan. http://www.mysticriver.org/publications/ActionPlan.html

Tur, Anthony P. November 21, 2007. Letter Response to John Zimmer, ENSR. Concord, NH.

Tur Anthony P. March 27, 2008. Letter Response to John Zimmer, ENSR. Concord, NH

Spectra Energy

# ALGONQUIN GAS TRANSMISSION, LLC

# J-2 LOOP PROJECT

## *Resource Report 4*

## *Cultural Resources*

# RESOURCE REPORT 4 – CULTURAL RESOURCES FERC ENVIRONMENTAL CHECKLIST

| **Part 380 – Minimum Filing Requirements for Environmental Reports** | **Company Compliance or Inapplicability of Requirement** |
|---|---|
| Overview/Survey Report<br>(§ 380.12(f)(l)(ii)+(2)). | Appendix 4B |
| Summary of Status of Cultural Resource Investigations (FERC Guidelines for Reporting on Cultural Resources Investigations (Guidelines)) | Section 4.5 |
| Unanticipated Discovery Plan<br>(Guidelines) | Appendix 4C |
| Documentation of consultation with SHPO(s) and Federal land management agencies<br>(§ 380.12(f)(l)(I)+(2)) | Section 4.3<br>Appendix 4A |
| Documentation of consultation with Native Americans<br>(§ 380.12(f)(l)(I)+(2)) | Section 4.3<br>Appendix 4A |
| Evaluation Reports (if necessary)<br>(Guidelines) | Not Applicable |
| Treatment Plans (if necessary)<br>(Guidelines) | Not Applicable |
| Notification of Completion of Treatment<br>(Guidelines) | Not Applicable |

## TABLE OF CONTENTS

4.0 CULTURAL RESOURCES ..... 1
4.1 INTRODUCTION ..... 1
4.2 SCOPE AND AUTHORITY ..... 1
4.3 AGENCY AND NATIVE AMERICAN CORRESPONDENCE ..... 2
4.3.1 Massachusetts State Historic Preservation Office Correspondence ..... 2
4.3.2 Native American Consultation ..... 3
4.3.3 Other Interested Parties Consultation ..... 4
4.4 AREA OF POTENTIAL EFFECT ..... 4
4.5 CULTURAL RESOURCE INVESTIGATIONS ..... 5
4.5.1 Overview Results ..... 5
4.5.2 Archaeological Survey Results ..... 6
4.5.2 Historic Architectural Properties Survey Results ..... 6
4.6 SUMMARY ..... 7

## LIST OF TABLES

TABLE 4.3-1 Native American Groups Contacted for the J-2 Loop Project ..... 4-3
TABLE 4.3-2 Additional Interested Parties Contacted for the J-2 Loop Project ..... 4-4

## LIST OF APPENDICES

APPENDIX 4A – AGENCY AND STAKEHOLDER CORRESPONDENCE
APPENDIX 4B – CULTURAL RESOURCE SURVEY REPORTS (PRIVILEGED AND CONFIDENTIAL – SEE VOLUME IV
APPENDIX 4C – PROCEDURES GUIDING THE DISCOVERY OF UNANTICIPATED CULTURAL RESOURCES AND HUMAN REMAINS

# 4.0 CULTURAL RESOURCES

## 4.1 INTRODUCTION

Resource Report 4 provides a discussion of existing cultural resources within the Project area. Section 4.2 of this report identifies the scope and authority of cultural resources investigations and consultation for the Project. Agency and Native American consultations are discussed in Section 4.3. The Area of Potential Effect ("APE") evaluated for cultural resources is defined in Section 4.4. Section 4.5 provides a summary of the cultural resources investigation to date and Section 4.6 provides a summary.

Agency and stakeholder correspondence related to cultural resources is provided in Appendix 4A of this report. The technical identification survey documentation upon which this Resource Report is based is provided in Appendix 4B. Given the privileged and confidential nature of the reports, this appendix is provided under separate cover in Volume IV. Plans describing the procedures guiding the unanticipated discovery of cultural resources and human remains for the Project are provided in Appendix 4C.

## 4.2 SCOPE AND AUTHORITY

The Project requires approvals and permits from federal, state, and local entities. One of the primary Project requirements at the federal level is a FERC Certificate of Public Convenience and Necessity under Section 7(c) of the Natural Gas Act. As a federal undertaking, the Project is being reviewed under Section 106 of the National Historic Preservation Act ("NHPA") of 1966, as amended. Prior to authorizing an undertaking (e.g., the issuance of a FERC approval or Certificate), Section 106 of the NHPA requires federal agencies, including the FERC, to take into account the effect of that undertaking on cultural resources listed or eligible for listing in the National Register of Historic Places ("National Register") (36 CFR §60). The agency must also afford the Advisory Council on Historic Preservation ("ACHP") the opportunity to comment on the undertaking. The Section 106 process is coordinated at the state level by the State Historic Preservation Office ("SHPO"), represented in Massachusetts by the Massachusetts Historical Commission ("MHC"). The issuance of a federal agency certificate depends, in part, on obtaining comments from the Massachusetts SHPO.

The primary goals of cultural resource investigations conducted as part of the Section 106 review are to:

- locate, document, and evaluate buildings, structures, objects, landscapes, and archaeological sites that are listed, or eligible for listing, in the National Register;
- assess potential impacts of the Project on those resources; and
- provide recommendations for subsequent treatment, if necessary.

In addition to Section 106, cultural resources investigations were conducted for the Project in accordance with FERC's Office of Energy Project's *Guidelines for Reporting on Cultural Resources Investigations* (2002), the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* (48 Fed. Reg. 44716-42, Sept. 29, 1983); Section 380.3 of the FERC's regulations; and the MHC's *Public Planning and Environmental Review: Archaeology and Historic Preservation* (1979) (Massachusetts General Laws, Chapter 9, Sections 26-27C (950 CMR 70-71)).

Algonquin's cultural resource consultant, The Public Archaeology Laboratory, Inc. ("PAL"), has prepared technical survey reports for both the archaeological overview survey and historic architectural properties identification survey for the Project, which is appended to this Resource Report. Due to the sensitive nature of some of the material within the reports, the covers and any applicable pages are labeled "CONTAINS PRIVILEGED AND CONFIDENTIAL INFORMATION – DO NOT RELEASE" in accordance with 36 CFR 800.11(c)(1) and are included in Volume IV.

## 4.3 AGENCY AND NATIVE AMERICAN CORRESPONDENCE

Algonquin, on behalf of the FERC, initiated Section 106 consultation with various state agencies and Native American groups in Massachusetts. This section details the correspondence Algonquin has had with each of these entities to date. All correspondence related to cultural resources surveys for the Project received to date are included in Appendix 4A. Correspondence from agencies and interested parties in response to the cultural resource documents submitted as part of this application will be forwarded to the FERC upon receipt.

### 4.3.1 Massachusetts State Historic Preservation Office Correspondence

Algonquin, on behalf of the FERC, initiated Section 106 consultation with the Massachusetts SHPO by submitting a Project information package for review and comment on October 17, 2007. The package included a full description of the proposed undertaking and the proposed Area of Potential Effects ("APE") for the Project. On October 25, 2007, the Massachusetts SHPO responded, requesting that a reconnaissance archaeological survey (950 CMR 70) be conducted to determine the archaeological sensitivity of the proposed pipeline route in relation to the documented location of the historic Middlesex Canal, a National Register listed historic property. According to the Massachusetts SHPO's comments, built-over portions of the Middlesex Canal are recorded as being within or in close proximity to the proposed pipeline route below Mystic Avenue in Somerville. On November 1, 2007, PAL submitted a Massachusetts State Archaeologist's Permit ("SAP") application to the MHC to conduct an archaeological overview (reconnaissance) survey for the Project. The MHC responded on November 2, 2007 by issuing SAP #3000 to conduct an archaeological survey for the Project.

On December 3, 2007, PAL submitted to the Massachusetts SHPO the draft *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains* for review and comment. The Massachusetts SHPO responded on December 19, 2007, indicating that the procedures were well structured and have taken into account previous SHPO comments on similar projects. In addition, on April 21, 2008, PAL submitted to the Massachusetts SHPO the architectural survey technical report for review and comment. Additionally, on April 21, 2008, PAL submitted the archaeological overview technical report for review and comment. Responses from the Massachusetts SHPO regarding the architectural and archaeological reports are pending.

### 4.3.2 Native American Consultation

Algonquin, on behalf of FERC, initiated consultation with two federally-recognized Native American tribes and the Massachusetts Commission on Indian Affairs to provide these groups an opportunity to identify any concerns about properties of traditional religious or cultural significance that may be affected by this undertaking. On December 3, 2007, PAL submitted to each of the tribal entities the draft *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains*. Additionally, on December 5 and 6, 2007, PAL attempted to contact each of the tribal entities by phone to follow-up on the initial consultation letters that were submitted on October 17, 2007. The MCIA were the only tribal entity to respond, indicating that they are not interested in further consultation regarding the Project; PAL left voice messages for the other two federally-recognized Native American tribes.

Table 4.3-1 lists the Native American groups contacted for the Project.

**TABLE 4.3-1**
**NATIVE AMERICAN GROUPS CONTACTED FOR THE PROPOSED J-2 LOOP PROJECT**

| Tribe Name | Contact Date | Date Response Received |
|---|---|---|
| Massachusetts Commission on Indian Affairs | 10/17/2007; 11/29/07; 12/3/07; 12/5/07 | 12/5/07 |
| Wampanoag Tribe of Gay Head (Aquinnah) | 10/17/2007; 11/29/07; 12/3/07; 12/6/07 | - |
| Mashpee Wampanoag Tribe | 10/17/2007; 11/29/07; 12/3/07; 12/6/07 | - |

### 4.3.3 Other Interested Parties Consultation

Algonquin initiated consultation with four additional interested parties regarding the cultural resource overview and identification surveys that were conducted for the Project. On April 21, 2008, PAL submitted copies of the archaeological and historic architectural properties technical reports to both the Somerville Historic Preservation Commission and the Medford Historical Commission. Also on April 21, 2008, PAL submitted copies of the archaeological technical report to both the Middlesex Canal Commission and the Middlesex Canal Association. Responses from the four additional consulting parties regarding the architectural and archaeological technical reports are pending.

Table 4.3-2 lists the additional consulting parties contacted for the Project.

**TABLE 4.3-2**
**ADDITIONAL INTERESTED PARTIES CONTACTED FOR THE PROPOSED J-2 LOOP PROJECT**

| Tribe Name | Contact Date | Date Response Received |
|---|---|---|
| Somerville Historic Preservation Commission | 4/21/08 | - |
| Medford Historical Commission | 4/21/08 | - |
| Middlesex Canal Commission | 4/21/08 | - |
| Middlesex Canal Association | 4/21/08 | - |

## 4.4 AREA OF POTENTIAL EFFECT

The APE is the "geographic area or areas within which an undertaking may directly or indirectly cause changes in the character of or use of historic properties, if any such properties exist" (36 CFR 800.16(d)). The APE is defined based upon the potential for effect, which may differ for aboveground resources (historic architectural properties and landscapes) and subsurface resources (archaeological sites). The APE may include all areas where the ground may be disturbed, where land use (i.e., traffic patterns, drainages, etc.) may change, or any locations from which the undertaking may be visible.

The APE for archaeological resources was based on the proposed construction workspace, which covers approximately 30 acres. Specifically, the APE for archaeological resources encompasses the physical construction limits identified on the Project alignment sheets in Appendix D of Resource Report 1.

The APE for historic architectural properties was developed to define the geographic limits within which such properties could be affected by workspace use and construction-related activities. This APE included the dimensions of the physical construction limits, noted above, and also extended to 50 feet to either side of the in-street construction work areas where numerous commercial and residential buildings are located, bringing the total APE for historic architectural resources to approximately 62.5 acres.

## 4.5 CULTURAL RESOURCE INVESTIGATIONS

Cultural resource investigations are conducted in accordance with FERC and Massachusetts SHPO guidelines. Suzanne G. Cherau, RPA, of PAL serves as Principal Investigator for archaeological investigations and Stephen A. Olausen, serves as the Senior Architectural Historian for all historic architectural properties survey work for the Project. Ms. Cherau and Mr. Olausen meet or exceed all requirements set forth by the Secretary of the Interior at 36 CFR Part 61.

### 4.5.1 Overview Results

The initial phase of investigation involved an overview survey to gather the information about previous cultural resource investigations and known archaeological sites and historic architectural properties within the Project APE. The information regarding archaeological sites was used to stratify the Project area into zones of cultural resource sensitivity. Cultural resources sensitivity is defined as the likelihood for pre- or post-contact cultural resources to be present within the Project area based on different categories of information. The following methodology was used to complete the overview:

- identification of any known archaeological sites and previously recorded historic architectural properties through background research and state site file searches. Data pertaining to the known sites, including their locational, functional, and temporal characteristics, were reviewed where applicable;
- review of recent cultural resource management surveys performed in the communities where the proposed Project is located; and
- review of primary and secondary historic information (e.g., maps, atlases, town histories) to learn of areas where previous structures and landscapes were potentially located.

Results of the overview survey for the Project indicated that the proposed J-2 Loop Project area is within close proximity to one archaeological property: the historic Middlesex Canal, which is listed in the National Register of Historic Places. Additionally, results of the overview survey indicated that the proposed Project area is located in a dense, built-up, urban area in close proximity to many historic architectural properties over 50 years of age. Information collected during the archival research and existing conditions review was used to determine the presence and survival potential for any potentially significant historic architectural properties and historic Middlesex Canal-related resources within the Project area.

### 4.5.2 Archaeological Survey Results

The overview survey research and data review, per the request of the Massachusetts SHPO, determined that the majority of the proposed J-2 Loop Project area is contained within existing street and highway rights-of-way (ROW) that do not contain any documented or recorded archaeological resources. However, the pipeline route appears to intersect the documented path of the historic Middlesex Canal in two locations within the corporate boundaries of Somerville. The survival potential of canal-related remains within these two areas was evaluated using available historic maps, street development/widening plans and profiles, and underground utilities plans and profiles using the route of the late nineteenth-century Massachusetts Water Resources Authority ("MWRA") underground sewer main in Mystic Avenue through Medford and Somerville.

Results of the MWRA background research and data review indicates that the documented built over section of the Middlesex Canal in Mystic Avenue was filled-in and absorbed into the street ROW and adjacent private residential lots by the 1880s The Mystic Avenue ROW currently contains numerous side-by-side underground utility easements, several of which appear to date back to the late-1800s. The documented built-over section of the Middlesex Canal route across Temple Street contained the "Ten Hills Bridge" that appears on city maps in 1852. The bridge components (timbers and portions of the stone abutments) were likely removed and reused elsewhere, but the extent of this removal/reuse and the presence of cultural strata and deposits associated with the canal bridge crossing are unknown. This section of the documented historic Middlesex Canal route with the bridge crossing in Somerville is assigned moderate archaeological sensitivity.

The remaining street ROW and cross-country sections of proposed pipeline route are assigned no/low sensitivity. The proposed pipeline will traverse though previously disturbed (by underground utilities and road construction) and filled areas. It is not expected that any potentially intact significant archaeological resources are present in the non-canal sections off Mystic Avenue, Temple, Broadway, School, and Medford Streets.

### 4.5.2 Historic Architectural Properties Survey Results

The identification survey for historic architectural properties revealed that any National Register listed or potentially eligible properties are located in dense, built-up urban areas outside the construction limits of the proposed pipeline. The construction of the pipeline near these properties will be confined to the existing roadway and will not involve any demolition of features outside the roadway or clearing of landscape elements. The pipeline will be located underground and will not have any permanent impacts on any of the identified properties. Potential impacts of the Project are limited to temporary inconveniences related to the construction of the pipeline, such as increased traffic congestion on adjacent roads, traffic detours, and construction noise.

## 4.6 SUMMARY

The archaeological overview survey and historic architectural properties identification survey are complete and technical reports have been submitted to the Massachusetts SHPO and all interested consulting parties. Responses from the Massachusetts SHPO and additional consulting parties regarding the architectural and archaeological reports are pending. All correspondence regarding the cultural resources aspect of the Project is included in Appendix 4A.

Regarding the archaeological overview survey, the section of the proposed J-2 Loop pipeline route across Temple Street, identified as having moderate sensitivity to contain possible structural remains and associated cultural strata and deposits of the Middlesex Canal historic site, is recommended for archaeological monitoring during project construction. The monitoring, to be conducted by a qualified archaeologist, would include photographic documentation and mapping of any identified cultural remains and strata associated with the historic Middlesex Canal. No further archaeological survey is recommended for the remaining sections of the proposed pipeline route, which have been assigned no/low sensitivity for intact archaeological resources.

Regarding the historic architectural properties identification survey, proposed additional temporary workspace associated with the Project would result in a direct effect to two properties that are recommended as potentially eligible for listing in the National Register: (1) St. Polycarp's Roman Catholic Church and Rectory, and (2) the Gilman Square Area. While neither of the properties would be physically affected, each property will be subject to direct impacts associated with temporary open space land use for construction workspace and materials storage. However, since the construction period is for a short duration, the pipeline will be underground, and no landscapes or historic properties will be permanently altered, it appears that the Project will have no adverse effect on properties listed in or eligible for listing in the National Register.

Spectra Energy

# Appendix 4A – Agency and Stakeholder Correspondence

# MASSACHUSETTS STATE HISTORIC PRESERVATION OFFICE CORRESPONDENCE

PAL

PRESERVATION PLANNING
ARCHAEOLOGY
ARCHITECTURAL HISTORY
RESEARCH

October 17, 2007

Brona Simon
State Historic Preservation Officer
Executive Director
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, Massachusetts 02125

Attn: Ed Bell

Re: Algonquin Gas Transmission, LLC
J-2 Expansion Project, Medford and Somerville, MA
PAL #2173

Dear Ms. Simon:

Algonquin Gas Transmission, LLC ("Algonquin") is seeking approval to proceed with construction of the Algonquin J-2 Expansion Project (the "Project"). The Project consists of a new 2.0 mile loop in the Towns of Medford and Somerville, which will expand the existing Algonquin Gas Transmission ("AGT") J-2 lateral system that serves NSTAR Gas Company's ("NSTAR") Cambridge system. Specifically, the Project involves the construction of 2.0 miles of 14-inch pipeline that loops from the interconnection with the AGT J-1 System at the Mystic tap to an interconnection with NSTAR at the border of Somerville and Cambridge. To assist you in your review, we have provided a U.S. Geological Survey ("USGS") map showing the location of the proposed Project.

Algonquin's intent is to file a formal application for review and approval from the Federal Energy Regulatory Commission ("FERC") and numerous other agencies. The permit proceedings, which will be conducted by these agencies, will provide an opportunity for public input and involvement. The FERC application is currently planned to be filed in the first quarter of 2008. All other agency applications will be filed in a similar time-frame. Algonquin proposes the J-2 Expansion Project facilities to be fully operational by September 2009.

On October 11, 2007, PAL staff, accompanied by an Algonquin representative, conducted a field visit to the Project area in Medford and Somerville. PAL staff observed that the proposed Project construction right-of-way is located in existing roadways and previously impacted areas. Additionally, review of the Inventory of Historic and Archaeological Assets of the Commonwealth indicates that there are no previously recorded archaeological sites located within or adjacent to the Project area. Therefore, due to the results of the recent walkover survey and background research, we are recommending that no archaeological investigation is necessary for the Project.

With this letter we are requesting your concurrence with this recommendation. If you have any questions or need any additional information, please do not hesitate to contact me at your convenience.

Sincerely,

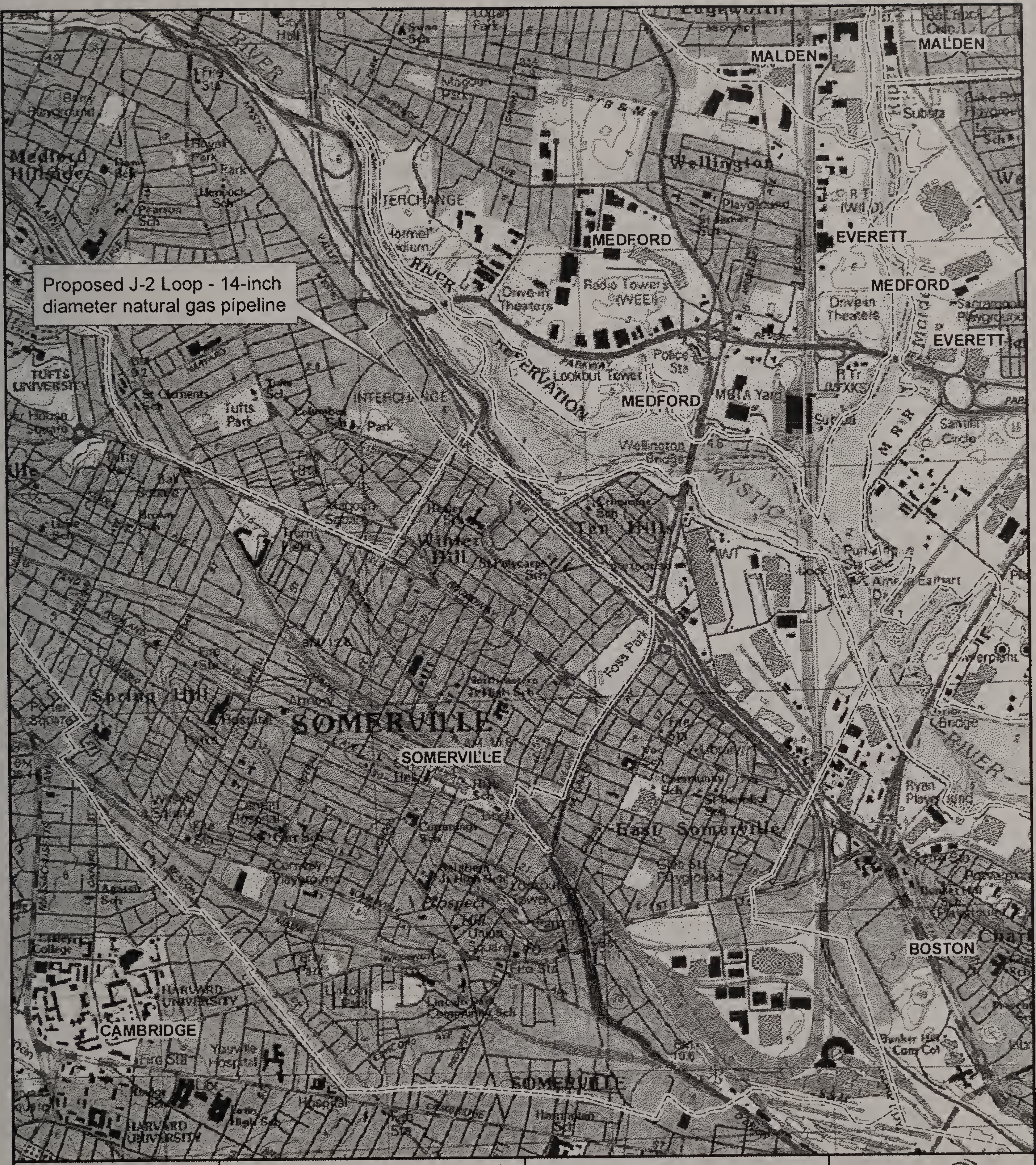
Deborah Cox

Deborah C. Cox, RPA
President

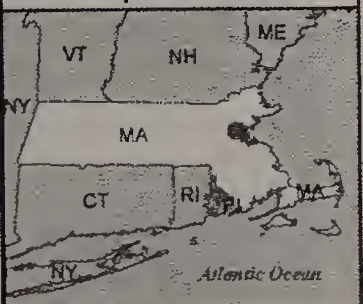
/dg

Enclosure

cc: Bill Brett, Algonquin (w/o encl.)



Map Location



Legend

▭ Municipal Boundary

---- Proposed J-2 Loop - 14-inch diameter natural gas pipeline

0 500 1,000 2,000 Feet

Scale: 1:24,000 (1 inch = 2,000 ft)

N

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Overview Map

Map Projection: State Plane MA Mainland, NAD83, US Feet
Image Source: USGS Topographic Quadrangles
Boston North and Boston South, MA

Spectra Energy

ENSR | AECOM

Figure 1

Date: October 2007

Project #: 02355-159-100

Y:\Projects\Spectra\J-2_Pipeline Project\MXD\Overview_mapping\J-2_Loop_Overview_topo_2007-10-17.mxd

**The Commonwealth of Massachusetts**
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

October 25, 2007

Deborah C. Cox
President
PAL
210 Lonsdale Avenue
Pawtucket, RI 02860

RE: Algonquin Gas Transmission, LLC, J-2 Expansion Project, Medford and Somerville, MA.
MHC #RC.43226

Dear Deborah:

Thank you for your inquiry to the Massachusetts Historical Commission for the project referenced above. Staff of the MHC have reviewed our files and the information submitted. The proposed project consists of the construction of a 2-mile loop of the Algonquin J-2 lateral 14-inch pipeline system in Medford and Somerville.

Review of the Inventory of Historic and Archaeological Assets of the Commonwealth determined that portions of the proposed pipeline below Mystic Avenue and McGrath Highway in Somerville are within or adjacent to the Middlesex Canal (SMV.HA.5), determined eligible by a vote of the Massachusetts State Review Board for listing in the National Register of Historic Places. The PAL conducted a reconnaissance archaeological survey for the canal and a nomination has been prepared and will soon be submitted to the National Park Service.

Please review the results of the PAL investigation. MHC requests a reconnaissance archaeological survey (950 CMR 70) with primary documentary research (parcel-level deed research and review of Middlesex Canal Corporation records) to determine the precise location of the canal and to review primary documents (e.g. records of utilities and boring logs) on the history of impacts at the area of the canal that may be affected. The survey should include the nature of any expected canal-related features and their probable integrity. Recommendations should be provided to identify, evaluate and avoid, minimize or mitigate any adverse effects to the Middlesex Canal.

These comments are provided to assist in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800), and M.G.L Chapter 9, section 26-27C (950 CMR 70-71). If you have further questions please contact Jonathan K. Patton at this office.

Sincerely,

Brona Simon

Brona Simon
State Historic Preservation Officer
Executive Director
State Archaeologist
Massachusetts Historical Commission

xc: Bill Brett, Algonquin

PAL

November 1, 2007

Brona Simon
Executive Director
State Archaeologist
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, Massachusetts 02125

Re: Algonquin Gas Transmission, LLC, J-2 Expansion Project
Archaeological Reconnaissance Survey
MHC #RC.43226, PAL #2173

Dear Ms. Simon:

Enclosed please find an application for a permit to conduct an archaeological reconnaissance survey. This application concerns the Algonquin Gas Transmission, LLC, J-2 Expansion Project in Medford and Somerville, Massachusetts. The project area is located on the Boston North and Boston South, Massachusetts topographic quadrangle. We would like to begin the investigations as soon as possible. Thank you in advance for your time and attention to this matter.

If you have any questions or concerns, please do not hesitate to contact Suzanne Cherau, Principal Investigator, or me at your convenience.

Sincerely,

Deborah C

Deborah C. Cox, RPA
President

/dg

Enclosure

cc: William Brett, Spectra Energy (w/encl.)

Public
Archaeology
Laboratory

210 Lonsdale Avenue
Pawtucket, RI 02860
TEL 401.728.8780
FAX 401.728.8784

# 950 CMR: DEPARTMENT OF THE STATE SECRETARY

## APPENDIX B
## COMMONWEALTH OF MASSACHUSETTS

## SECRETARY OF STATE: MASSACHUSETTS HISTORICAL COMMISSION

## PERMIT APPLICATION: ARCHAEOLOGICAL FIELD INVESTIGATION

### A. General Information

Pursuant to Section 27(c) of Chapter 9 of the General Laws and according to the regulations outlined in 950 CMR 70.00, a permit to conduct a field investigation is hereby requested.

1. Name(s): Suzanne G. Cherau

2. Institution: The Public Archaeology Laboratory, Inc.

   Address:
   210 Lonsdale Avenue
   Pawtucket, Rhode Island 02860

3. Project Location: AGT J-2 Expansion Project
   *see attached proposal*

4. Town(s): Somerville and Medford

5. Attach a copy of a USGS quadrangle with the project area clearly marked.

   *see attached*

6. Property Owner(s): City of Somerville, City of Medford

7. The applicant affirms that the owner has been notified and has agreed that the applicant may perform the proposed field investigation.

8. The proposed field investigation is for a(n):

   **a. Reconnaissance Survey**
   b. Intensive Survey
   c. Site Examination
   d. Data Recovery

## B. Professional Qualifications

1. Attach a personnel chart and project schedule as described in 950 CMR 70.11 (b).

**a. Personnel**

Principal Investigator(s): Suzanne Cherau

Project Archaeologist(s): Jennifer Banister

**b. Schedule**

Research: November 2007

Report: December 2007

2. Include copies of curriculum vitae of key personnel (unless already on file with the State Archaeologist).

## C. Research Design

1. Attach a narrative description of the proposed Research Design according to the requirements of 950 CMR 70.11.

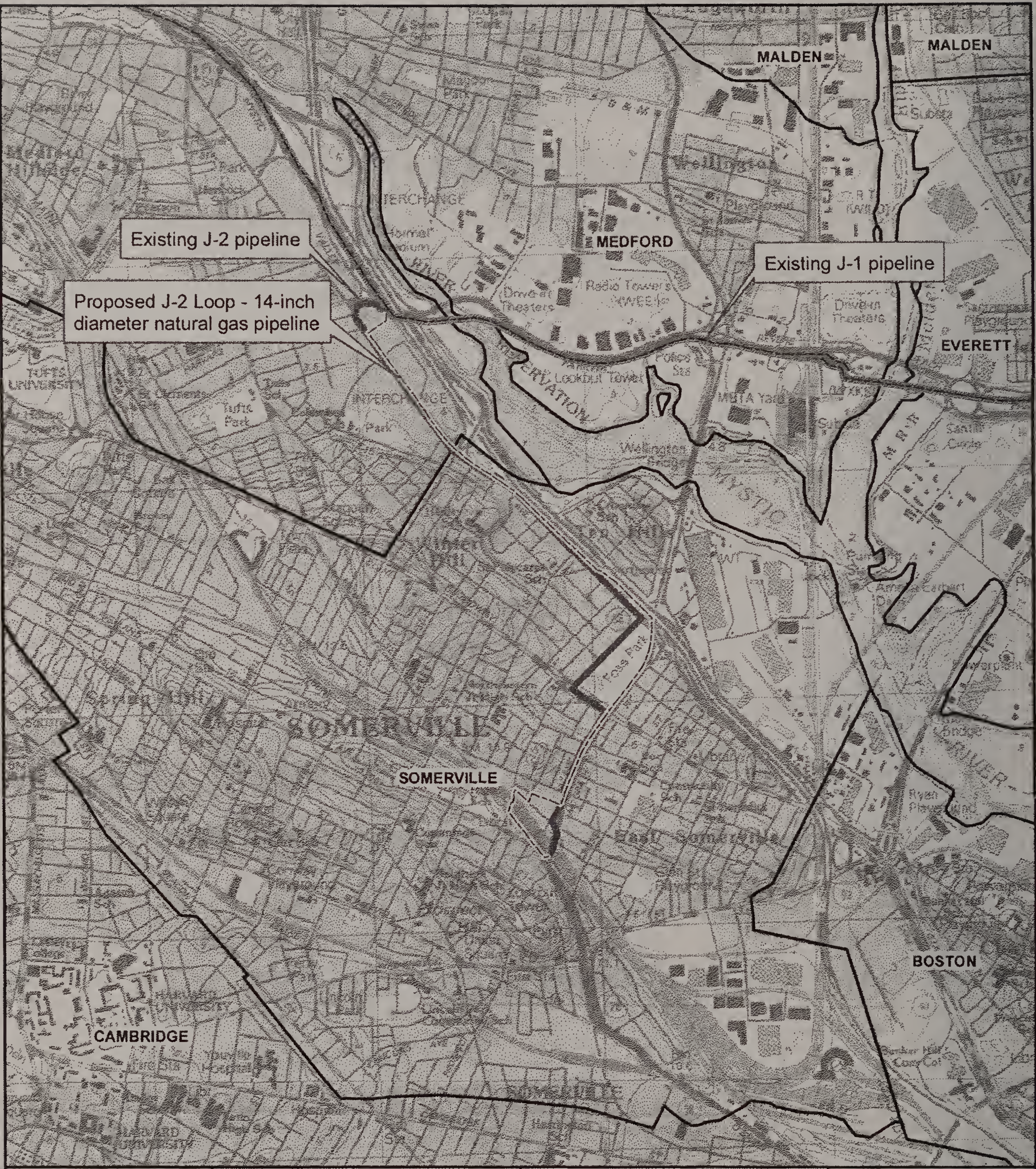
2. The Applicant agrees to perform the field investigations according to the standards outlined in 950 CMR 70.13.

3. The Applicant agrees to submit a Summary Report, prepared according to the standards outlined in 950 CMR 70.14 by: March 2008

4. The specimens recovered during performance of the proposed field investigation will be curated at:

The Public Archaeology Laboratory, Inc.
210 Lonsdale Avenue
Pawtucket, Rhode Island 02860

SIGNATURE ______________________ November 1, 2007
APPLICANT(S) DATE

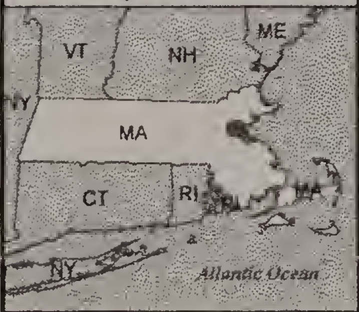


Existing J-2 pipeline

Proposed J-2 Loop - 14-inch diameter natural gas pipeline

Existing J-1 pipeline

Map Location



Legend

| | |
|---|---|
| ▭ | Municipal Boundary |
| - - - | Proposed J-2 Loop - 14-inch diameter natural gas pipeline |
| ▬ | Exising J-2 pipeline |
| ▬ | Existing J-1 pipeline |

N

0 500 1,000 2,000 Feet

Scale: 1 24,000
(1 inch = 2,000 ft)

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Overview Map

Map Projection State Plane MA Mainland, NAD83, US Feet
Image Source USGS Topographic Quadrangles
Boston North and Boston South, MA.

Spectra Energy

ENSR | AECOM

Figure 1

Date: October 2007

Project #: 02355-159-100

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\Overview_mapping\J-2_Loop_Overview_topo_2007-10-18.mxd

**The Commonwealth of Massachusetts**
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

---

PERMIT TO CONDUCT ARCHAEOLOGICAL FIELD INVESTIGATION

---

Permit Number 3000 Date of Issue November 2, 2007

Expiration Date November 2, 2008

PAL is hereby authorized to conduct an archaeological field investigation pursuant to Section 27C of Chapter 9 of General Laws and according to the regulations outlined in 950 CMR 70.00.

Algonquin Gas Transmission LLC, J-2 Expansion Project, Somerville & Medford

Project Location

Brona Simon
Brona Simon, State Archaeologist
Massachusetts Historical Commission

220 Morrissey Boulevard, Boston, Massachusetts 02125
(617) 727-8470 • Fax: (617) 727-5128
www.sec.state.ma.us/mhc

PAL

December 3, 2007

Brona Simon
Executive Director
State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, Massachusetts 02125

Attn: Edward L. Bell

Re: Algonquin Gas Transmission, LLC
J-2 Loop Project, Medford and Somerville, MA
MHC #RC.43226; PAL #2173

Dear Ms. Simon:

On behalf of Algonquin Gas Transmission, LLC ("Algonquin"), enclosed please find a draft of the *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains* for your review and comment. The procedures define the approach that Algonquin will follow during construction of the J-2 Loop Project in Medford and Somerville.

Our intent is to formally submit the document to your office and the FERC after receipt of your review. Your office will be receiving the procedures as part of the FERC filing in January 2008. Please note that versions of this document have been submitted to your office for other Algonquin projects, most recently as part of the archaeological survey for Algonquin's East to West HubLine Expansion Project (MHC #RC.42240).

If you have any questions or require additional information, please do not hesitate to contact Suzanne G. Cherau, Principal Investigator, or me at your convenience. We appreciate your attention to this matter.

Sincerely,

Deborah Cox

Deborah C. Cox, RPA
President

/dg

Enclosure

cc: Bill Brett, Algonquin (w/o encl.)

Public
Archaeology
Laboratory

210 Lonsdale Avenue
Pawtucket, RI 02860
tel 401.728.8780
fax 401.728.8784

**The Commonwealth of Massachusetts**
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

December 19, 2007

Deborah C. Cox
President
PAL
210 Lonsdale Avenue
Pawtucket, RI 02860

RE: Algonquin Gas Transmission, LLC, J-2 Expansion Project, Medford and Somerville, MA.
MHC #RC.43226. PAL #2173.

Dear Deborah:

Staff of the Massachusetts Historical Commission have reviewed the draft *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains*. for the project referenced above. The procedures are well structured and take into account previous MHC comments on other similar projects. Prior to finalizing the document, please change 'SPHO' to read 'SHPO' (Page 3, #6).

These comments are provided to assist in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800). If you have further questions please contact Jonathan K. Patton at this office.

Sincerely,

Brona Simon

Brona Simon
State Historic Preservation Officer
Executive Director
State Archaeologist
Massachusetts Historical Commission

xc: Bill Brett, Spectra Energy

PAL

April 21, 2008

Brona Simon
State Historic Preservation Officer
Executive Director
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, Massachusetts 02125

Attn: Jonathan K. Patton

Re: Algonquin Gas Transmission, LLC
J-2 Loop Project, Medford and Somerville, MA
MHC #RC.43226; PAL #2173

Dear Ms. Simon:

On behalf of Algonquin Gas Transmission, LLC (Algonquin) enclosed please find the archaeological survey technical report entitled, *Archaeological Overview Survey, Algonquin Gas Transmission, LLC, J-2 Loop Project, Medford and Somerville, Massachusetts*, and the historic architectural properties survey technical report entitled, *Historic Architectural Properties Identification Survey, Algonquin Gas Transmission, LLC, J-2 Loop Project, Medford and Somerville, Massachusetts*, for your review and comment. You will be receiving the official FERC filing in May including Resource Report 4 with these technical reports included as an Appendix.

If you have any questions or require any additional information, please do not hesitate to contact Suzanne G. Cherau, Principal Investigator or Stephen A. Olausen, Senior Architectural Historian, at your convenience. We appreciate your time and attention to this matter.

Sincerely,

Gregory R. Dubell, RPA
Energy Projects Manager

/dg

Enclosures

cc: William B. Brett, Algonquin (w/o encl.)
John Zimmer, ENSR (w/o encl.)

Public
Archaeology
Laboratory

210 Lonsdale Avenue
Pawtucket, RI 02860
TEL 401.728.8780
FAX 401.728.8784

# LOCAL HISTORICAL COMMISSIONS CORRESPONDENCE

PAL

April 21, 2008

Nino Susi, Chairperson
Medford Historical Commission
c/o Office of Community Development
Medford City Hall
85 George P. Hassett Drive
Medford, Massachusetts 02155

Re: Algonquin Gas Transmission, LLC
J-2 Loop Project, Medford and Somerville, MA
MHC #RC.43226; PAL #2173

Dear Mr. Susi:

Algonquin Gas Transmission, LLC (Algonquin) is seeking approval to proceed with construction of the Algonquin J-2 Loop Project (Project). The Project consists of a new approximately 2.29 mile loop in the Towns of Medford and Somerville, which will expand the existing Algonquin J-2 lateral system that serves NSTAR Gas Company's (NSTAR) Cambridge system. Specifically, the Project involves the construction of approximately 2.29 miles of 14-inch pipeline that loops from the interconnection with the Algonquin J-1 System at the Mystic tap to an interconnection with NSTAR at the border of Somerville and Cambridge. To assist you in your review, we have provided a U.S. Geological Survey (USGS) map showing the location of the proposed Project.

The Public Archaeology Laboratory, Inc. (PAL) has been contracted by Algonquin to conduct a survey for the presence of historic properties within the area of potential effect (APE) and to assist the FERC in complying with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800).

PAL has completed an archaeological overview survey for the J-2 Loop Project. On behalf of Algonquin, please find enclosed the technical report entitled, *Archaeological Overview Survey, Algonquin Gas Transmission, LLC, J-2 Loop Project, Medford and Somerville, Massachusetts.* The archaeological overview survey determined that the majority of the Project area is located within existing street and highway rights-of-way that do not contain any documented or recorded archaeological resources. However, the proposed Project appears to intersect the currently mapped historic Middlesex Canal in two locations within the corporate boundaries of Somerville. Specifically, the one section of the proposed Project route across Temple Street was identified as having moderate sensitivity to contain possible structural remains and associated cultural deposits of the Middlesex Canal is recommended for archaeological monitoring during Project construction work.

Additionally, PAL has completed an historic architectural properties identification survey for the Project. On behalf of Algonquin, please find enclosed the technical report entitled, *Historic Architectural Properties Identification Survey, Algonquin Gas Transmission, LLC, J-2 Loop*

Public
Archaeology
Laboratory

210 Lonsdale Avenue
Pawtucket, RI 02860
TEL 401.728.8780
FAX 401.728.8784

*Project, Medford and Somerville, Massachusetts.* The historic architectural properties identification survey determined that the Project will have no adverse effect on seven properties within the APE that are eligible for listing or are listed in the National Register of Historic Places.

PAL, on behalf of the FERC, is seeking the comments of the Medford Historical Commission regarding the effect the Project may have on any historic properties in the City of Medford. We appreciate your review of the enclosed material and respectfully request a response to assist the FERC in complying with its Section 106 review processes.

If you have any questions or need any additional information, please do not hesitate to contact Suzanne G. Cherau, RPA, Principal Investigator, or Stephen A. Olausen, Senior Architectural Historian, at your convenience.

Sincerely,

Greg R. Dubell

Gregory R. Dubell, RPA
Energy Projects Manager

/dg

Enclosures

cc: William B. Brett, Algonquin (w/o encl.)
John Zimmer, ENSR (w/o encl.)
Brona Simon, MHC (w/o encl.)

P
A
L

April 21, 2008

Brandon Wilson
Director
Somerville Historic Preservation Commission
City Hall
93 Highland Avenue
Somerville, Massachusetts 02143

Re: Algonquin Gas Transmission, LLC
J-2 Loop Project, Medford and Somerville, MA
MHC #RC.43226; PAL #2173

Dear Ms. Wilson:

Algonquin Gas Transmission, LLC (Algonquin) is seeking approval to proceed with construction of the Algonquin J-2 Loop Project (Project). The Project consists of a new approximately 2.29 mile loop in the Towns of Medford and Somerville, which will expand the existing Algonquin J-2 lateral system that serves NSTAR Gas Company's (NSTAR) Cambridge system. Specifically, the Project involves the construction of approximately 2.29 miles of 14-inch pipeline that loops from the interconnection with the Algonquin J-1 System at the Mystic tap to an interconnection with NSTAR at the border of Somerville and Cambridge. To assist you in your review, we have provided a U.S. Geological Survey (USGS) map showing the location of the proposed Project.

The Public Archaeology Laboratory, Inc. (PAL) has been contracted by Algonquin to conduct a survey for the presence of historic properties within the area of potential effect (APE) and to assist the FERC in complying with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800).

PAL has completed an archaeological overview survey for the J-2 Loop Project. On behalf of Algonquin, please find enclosed the technical report entitled, *Archaeological Overview Survey, Algonquin Gas Transmission, LLC, J-2 Loop Project, Medford and Somerville, Massachusetts*. The archaeological overview survey determined that the majority of the Project area is located within existing street and highway rights-of-way that do not contain any documented or recorded archaeological resources. However, the proposed Project appears to intersect the currently mapped historic Middlesex Canal in two locations within the corporate boundaries of Somerville. Specifically, the one section of the proposed Project route across Temple Street was identified as having moderate sensitivity to contain possible structural remains and associated cultural deposits of the Middlesex Canal is recommended for archaeological monitoring during Project construction work.

Additionally, PAL has completed an historic architectural properties identification survey for the Project. On behalf of Algonquin, please find enclosed the technical report entitled, *Historic Architectural Properties Identification Survey, Algonquin Gas Transmission, LLC, J-2 Loop*

Public
Archaeology
Laboratory

210 Lonsdale Avenue
Pawtucket, RI 02860
TEL 401.728.8780
FAX 401.728.8784

*Project, Medford and Somerville, Massachusetts.* The historic architectural properties identification survey determined that the Project will have no adverse effect on seven properties within the APE that are eligible for listing or are listed in the National Register of Historic Places.

PAL, on behalf of the FERC, is seeking the comments of the Somerville Historic Preservation Commission regarding the effect the Project may have on any historic properties in the City of Somerville. We appreciate your review of the enclosed material and respectfully request a response to assist the FERC in complying with its Section 106 review processes.

If you have any questions or need any additional information, please do not hesitate to contact Suzanne G. Cherau, Principal Investigator, or Stephen A. Olausen, Senior Architectural Historian, at your convenience.

Sincerely,

Gregory R. Dubell, RPA
Energy Projects Manager

/dg

Enclosures

cc: William B. Brett, Algonquin (w/o encl.)
John Zimmer, ENSR (w/o encl.)
Brona Simon, MHC (w/o encl.)

PAL

Public
Archaeology
Laboratory

210 Lonsdale Avenue
Pawtucket, RI 02860
TEL 401.728.8780
FAX 401.728.8784

April 21, 2008

Thomas Raphael
Chairperson
Executive Committee
Middlesex Canal Commission
90 Grove Street
Winchester, Massachusetts 01890

Re: Algonquin Gas Transmission, LLC
J-2 Loop Project, Medford and Somerville, MA
MHC #RC.43226; PAL #2173

Dear Mr. Raphael:

Algonquin Gas Transmission, LLC (Algonquin) is seeking approval to proceed with construction of the Algonquin J-2 Loop Project (Project). The Project consists of a new approximately 2.29 mile loop in the Towns of Medford and Somerville, which will expand the existing Algonquin J-2 lateral system that serves NSTAR Gas Company's (NSTAR) Cambridge system. Specifically, the Project involves the construction of approximately 2.29 miles of 14-inch pipeline that loops from the interconnection with the Algonquin J-1 System at the Mystic tap to an interconnection with NSTAR at the border of Somerville and Cambridge. To assist you in your review, we have provided a U.S. Geological Survey (USGS) map showing the location of the proposed Project.

The Public Archaeology Laboratory, Inc. (PAL) has been contracted by Algonquin to conduct a survey for the presence of historic properties within the area of potential effect (APE) and to assist the FERC in complying with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800).

PAL has completed an archaeological overview survey for the J-2 Loop Project. On behalf of Algonquin, please find enclosed the technical report entitled, *Historic Archaeological Overview Survey, Algonquin Gas Transmission, LLC, J-2 Loop Project, Medford and Somerville, Massachusetts*. The archaeological overview survey determined that the majority of the Project area is located within existing street and highway rights-of-way that do not contain any documented or recorded archaeological resources. However, the proposed Project appears to intersect the currently mapped historic Middlesex Canal in two locations within the corporate boundaries of Somerville. Specifically, the one section of the proposed Project route across Temple Street was identified as having moderate sensitivity to contain possible structural remains and associated cultural deposits of the Middlesex Canal is recommended for archaeological monitoring during Project construction work.

PAL, on behalf of the FERC, is seeking the comments of the Middlesex Canal Commission regarding the effect the Project may have on those portions of the Middlesex Canal located in

Medford and Somerville. We appreciate your review of the enclosed material and respectfully request a response to assist the FERC in complying with its Section 106 review processes.

If you have any questions or need any additional information, please do not hesitate to contact Suzanne G. Cherau, RPA, Principal Investigator, or me at your convenience.

Sincerely,

Gregory R. Dubell, RPA
Energy Projects Manager

/dg

Enclosure

cc: William B. Brett, Algonquin (w/o encl.)
John Zimmer, ENSR (w/o encl.)
Brona Simon, MHC (w/o encl.)

P
A
L

April 21, 2008

Nolan T. Jones
President
Middlesex Canal Association
24 Quarry Circle
Milford, New Hampshire 03055

Re: Algonquin Gas Transmission, LLC
J-2 Loop Project, Medford and Somerville, MA
MHC #RC.43226; PAL #2173

Dear Mr. Jones:

Algonquin Gas Transmission, LLC (Algonquin) is seeking approval to proceed with construction of the Algonquin J-2 Loop Project (Project). The Project consists of a new approximately 2.29 mile loop in the Towns of Medford and Somerville, which will expand the existing Algonquin J-2 lateral system that serves NSTAR Gas Company's (NSTAR) Cambridge system. Specifically, the Project involves the construction of approximately 2.29 miles of 14-inch pipeline that loops from the interconnection with the Algonquin J-1 System at the Mystic tap to an interconnection with NSTAR at the border of Somerville and Cambridge. To assist you in your review, we have provided a U.S. Geological Survey (USGS) map showing the location of the proposed Project.

The Public Archaeology Laboratory, Inc. (PAL) has been contracted by Algonquin to conduct a survey for the presence of historic properties within the area of potential effect (APE) and to assist the FERC in complying with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800).

PAL has completed an archaeological overview survey for the J-2 Loop Project. On behalf of Algonquin, please find enclosed the technical report entitled, *Archaeological Overview Survey, Algonquin Gas Transmission, LLC, J-2 Loop Project, Medford and Somerville, Massachusetts.* The archaeological overview survey determined that the majority of the Project area is located within existing street and highway rights-of-way that do not contain any documented or recorded archaeological resources. However, the proposed Project appears to intersect the currently mapped historic Middlesex Canal in two locations within the corporate boundaries of Somerville. Specifically, the one section of the proposed Project route across Temple Street was identified as having moderate sensitivity to contain possible structural remains and associated cultural deposits of the Middlesex Canal is recommended for archaeological monitoring during Project construction work.

PAL, on behalf of the FERC, is seeking the comments of the Middlesex Canal Association regarding the effect the Project may have on those portions of the Middlesex Canal located in Medford and Somerville. We appreciate your review of the enclosed material and respectfully request a response to assist the FERC in complying with its Section 106 review processes.

Public
Archaeology
Laboratory

210 Lonsdale Avenue
Pawtucket, RI 02860
TEL 401.728.8780
FAX 401.728.8784

If you have any questions or need any additional information, please do not hesitate to contact Suzanne G. Cherau, Principal Investigator, or me at your convenience.

Sincerely,

Gregory R. Dubell, RPA
Energy Projects Manager

/dg

Enclosure

cc: William B. Brett, Algonquin (w/o encl.)
John Zimmer, ENSR (w/o encl.)
Brona Simon, MHC (w/o encl.)

# MASSACHUSETTS NATIVE AMERICAN CORRESPONDENCE

PAL

October 17, 2007

Jim Peters
Executive Director
Massachusetts Commission on Indian Affairs
100 Cambridge Street, Suite 300
Boston, Massachusetts 02114

Re: Algonquin Gas Transmission, LLC
J-2 Expansion Project, Medford and Somerville, MA
PAL #2173

Dear Mr. Peters:

Algonquin Gas Transmission, LLC ("Algonquin") is seeking approval to proceed with construction of the Algonquin J-2 Expansion Project (the "Project"). The Project consists of a new 2.0 mile loop in the Towns of Medford and Somerville, which will expand the existing Algonquin Gas Transmission ("AGT") J-2 lateral system that serves NSTAR Gas Company's ("NSTAR") Cambridge system. Specifically, the Project involves the construction of 2.0 miles of 14-inch pipeline that loops from the interconnection with the AGT J-1 System at the Mystic tap to an interconnection with NSTAR at the border of Somerville and Cambridge. To assist you in your review, we have provided a U.S. Geological Survey ("USGS") map showing the location of the proposed Project.

Algonquin's intent is to file a formal application for review and approval from the Federal Energy Regulatory Commission ("FERC") and numerous other agencies. The permit proceedings, which will be conducted by these agencies, will provide an opportunity for public input and involvement. The FERC application is currently planned to be filed in the first quarter of 2008. All other agency applications will be filed in a similar time-frame. Algonquin proposes the J-2 Expansion Project facilities to be fully operational by September 2009.

On behalf of Algonquin, PAL requests your review of the attached map to determine if any part of the Project area crosses or is located near areas of traditional, cultural, or religious importance that you are aware of.

If you have any questions or need any additional information, please do not hesitate to contact Gregory R. Dubell, Energy Projects Manager, or me at your convenience.

Public
Archaeology
Laboratory

210 Lonsdale Avenue
Pawtucket, RI 02860
TE 401.728.8780
FAX 401.728.8784

Sincerely,

Deborah Cox

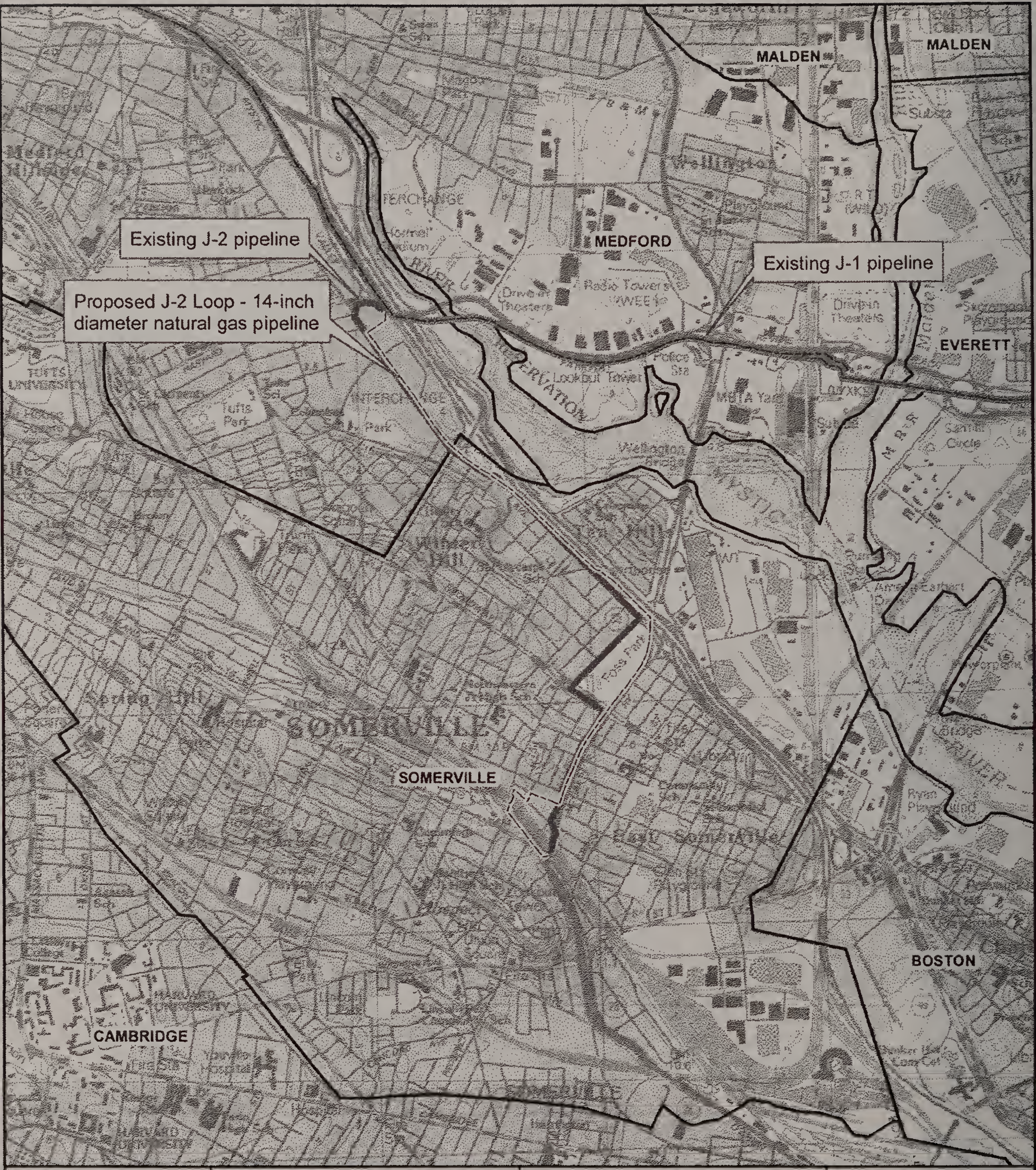
Deborah C. Cox, RPA
President

/dg

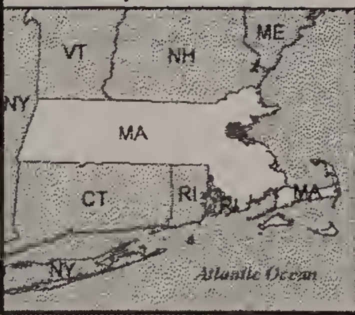
Enclosure

cc: Bill Brett, Algonquin (w/o encl.)

THE FOLLOWING MAP WAS SUBMITTED TO ALL
MASSACHUSETTS NATIVE AMERICAN CONTACTS



Map Location



Legend

[ ] Municipal Boundary

--- Proposed J-2 Loop - 14-inch diameter natural gas pipeline

▬ Exising J-2 pipeline

▬ Exising J-1 pipeline

0 500 1,000 2,000 Feet

Scale: 1:24,000 (1 inch = 2,000 ft)

N

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Overview Map

Map Projection State Plane MA Mainland, NAD83, US Feet
Image Source USGS Topographic Quadrangles
Boston North and Boston South, MA

Spectra Energy

ENSR | AECOM

Figure 1

Date: October 2007

Project #: 02355-159-100

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\Overview_mapping\J-2_Loop_Overview_topo_2007-10-18.mxd

**Gregory R. Dubell**

**From:** Gregory R. Dubell
**Sent:** Thursday, November 29, 2007 8:15 AM
**To:** 'indian_affairs@hotmail.com'
**Subject:** Algonquin Gas Transmission, LLC - Proposed J-2 Loop Project

Dear Mr. Peters,

I am writing to follow up on the package of information that PAL sent to you on October 17, 2007 regarding the Algonquin J-2 Loop pipeline project in Medford and Somerville, Massachusetts. I am managing the cultural resources aspect of the project and wanted to make sure that you received the letter and map of the project area. I also wanted to let you know that Suzanne Cherau is currently conducting a reconnaissance archaeological survey of the project area to determine if there are any intact portions of the Middlesex Canal located within the boundaries of the project area. We anticipate submitting the archaeological report to the MHC in the next week or two.

Please do not hesitate to contact me if you have any questions or would like to visit the project area. You can contact me by email, the address below, or by cell phone (also below).

Sincerely,
Greg Dubell

Gregory R. Dubell
Energy Projects Manager
The Public Archaeology Laboratory, Inc.
210 Lonsdale Avenue
Pawtucket, Rhode Island 02860
401-728-8780 (office)
401-595-3254 (mobile)
401-728-8784 (office fax)
www.palinc.com

P
A
L

[illegible]

Public
Archaeology
Laboratory

December 3, 2007

Jim Peters
Executive Director
Massachusetts Commission on Indian Affairs
100 Cambridge Street, Suite 300
Boston, Massachusetts 02114

Re: Algonquin Gas Transmission, LLC
J-2 Loop Project, Medford and Somerville, MA
PAL #2173

Dear Mr. Peters:

On behalf of Algonquin Gas Transmission, LLC ("Algonquin"), enclosed please find a draft of the *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains*. The procedures define the approach that Algonquin will follow during construction of the J-2 Loop Project in Medford and Somerville.

Your office will be receiving the procedures as part of the FERC filing in January 2008. If you have any questions or require additional information, please do not hesitate to contact Gregory R. Dubell, Energy Projects Manager, or me at your convenience.

Sincerely,

Deborah Cox

Deborah C. Cox, RPA
President

/dg

Enclosure

cc: Bill Brett, Algonquin (w/o encl.)

210 Lonsdale Avenue
Pawtucket, RI 02860
tel 401.728.8780
fax 401.728.8784

# PAL PHONE DIALOG

Call ID 9025

**I (Name)** Greg Dubell

**Talked with** Jim Peters **of** MA Commission on Indian Affairs **Ph** 617-573-1292 ext

**Regarding:** **PAL Proj. No.** 2173 **Name** AGT J-2 Loop Project

**Other**

**Date** 12/5/2007 **Time** 4:17 PM **Party Called** ✓ **I Called**

**I said:**

(1) Provided my name company affiliation, and project background, and asked whether the MCIA had received the notification letter dated 10/17/2007 and whether they were interested in consultation.

**Party said:**

(2) MCIA is not interested in consultation for the J-2 Loop Project.

**Action Taken:**

**cc:**

**Copy to file**

PAL

October 17, 2007

Cheryl Andrews-Maltais
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Re: Algonquin Gas Transmission, LLC
J-2 Expansion Project, Medford and Somerville, MA
PAL #2173

Dear Ms. Andrews-Maltais:

Algonquin Gas Transmission, LLC ("Algonquin") is seeking approval to proceed with construction of the Algonquin J-2 Expansion Project (the "Project"). The Project consists of a new 2.0 mile loop in the Towns of Medford and Somerville, which will expand the existing Algonquin Gas Transmission ("AGT") J-2 lateral system that serves NSTAR Gas Company's ("NSTAR") Cambridge system. Specifically, the Project involves the construction of 2.0 miles of 14-inch pipeline that loops from the interconnection with the AGT J-1 System at the Mystic tap to an interconnection with NSTAR at the border of Somerville and Cambridge. To assist you in your review, we have provided a U.S. Geological Survey ("USGS") map showing the location of the proposed Project.

Algonquin's intent is to file a formal application for review and approval from the Federal Energy Regulatory Commission ("FERC") and numerous other agencies. The permit proceedings, which will be conducted by these agencies, will provide an opportunity for public input and involvement. The FERC application is currently planned to be filed in the first quarter of 2008. All other agency applications will be filed in a similar time-frame. Algonquin proposes the J-2 Expansion Project facilities to be fully operational by September 2009.

On behalf of Algonquin, PAL requests your review of the attached map to determine if any part of the Project area crosses or is located near areas of traditional, cultural, or religious importance that you are aware of.

If you have any questions or need any additional information, please do not hesitate to contact Gregory Dubell, Energy Projects Manager,, or me at your convenience.

Public
Archaeology
Laboratory

210 Lonsdale Avenue
Pawtucket, RI 02860
TEL 401.728.8780
FAX 401.728.8784

Sincerely,

Deborah C Cox

Deborah C. Cox, RPA
President

/dg

Enclosure

cc: Bill Brett, Algonquin (w/o encl.)

**Gregory R. Dubell**

**From:** Gregory R. Dubell
**Sent:** Thursday, November 29, 2007 8:12 AM
**To:** 'cmaltais@wampanoagtribe.net'
**Subject:** Algonquin Gas Transmission, LLC - Proposed J-2 Loop Project

Dear Ms. Maltais,

I am writing to follow up on the package of information that PAL sent to you on October 17, 2007 regarding the Algonquin J-2 Loop pipeline project in Medford and Somerville, Massachusetts. I am managing the cultural resources aspect of the project and wanted to make sure that you received the letter and map of the project area. I also wanted to let you know that Suzanne Cherau is currently conducting a reconnaissance archaeological survey of the project area to determine if there are any intact portions of the Middlesex Canal located within the boundaries of the project area. We anticipate submitting the archaeological report to the MHC in the next week or two.

Please do not hesitate to contact me if you have any questions or would like to visit the project area. You can contact me by email, the address below, or by cell phone (also below).

Sincerely,
Greg Dubell

Gregory R. Dubell
Energy Projects Manager
The Public Archaeology Laboratory, Inc.
210 Lonsdale Avenue
Pawtucket, Rhode Island 02860
401-728-8780 (office)
401-595-3254 (mobile)
401-728-8784 (office fax)
www.palinc.com

P
A
L

December 3, 2007

Cheryl Andrews-Maltais
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Re: Algonquin Gas Transmission, LLC
J-2 Loop Project, Medford and Somerville, MA
PAL #2173

Dear Ms. Andrews- Maltais:

On behalf of Algonquin Gas Transmission, LLC ("Algonquin"), enclosed please find a draft of the *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains*. The procedures define the approach that Algonquin will follow during construction of the J-2 Loop Project in Medford and Somerville.

Your office will be receiving the procedures as part of the FERC filing in January 2008. If you have any questions or require additional information, please do not hesitate to contact Gregory R. Dubell, Energy Projects Manager, or me at your convenience.

Sincerely,

Deborah Cox

Deborah C. Cox, RPA
President

/dg

Enclosure

cc: Bill Brett, Algonquin (w/o encl.)

Public
Archaeology
Laboratory

210 Lonsdale Avenue
Pawtucket, RI 02860
TEL 401.728.8780
FAX 401.728.8784

## PAL PHONE DIALOG

Call ID 9029

**I (Name)** Greg Dubell

**Talked with** Cheryl Andrews-Malt **of** Wampanoag Tribe of Gay Head (Aq **Ph** 508-645-9265 ext 112

**Regarding:** **PAL Proj. No.** 2173 **Name** AGT J-2 Loop Project

**Other**

**Date** 12/6/2007 **Time** 9:59 AM **Party Called** ✓ **I Called**

**I said:**

Left voice message asking Cheryl Andrews-Maltais (THPO) to confirm receipt of notification letter dated 10/17/2007 and whether tribe is interested in consultation.

**Party said:**

**Action Taken:**

**cc:** **Copy to file**

PAL

October 17, 2007

Shawn W. Hendricks, Sr.
Chairman
Mashpee Wampanoag Tribal Council, Inc.
P.O. Box 1048
483 Great Neck Road South
Mashpee, Massachusetts 02649

Re: Algonquin Gas Transmission, LLC
J-2 Expansion Project, Medford and Somerville, MA
PAL #2173

Dear Mr. Hendricks:

Algonquin Gas Transmission, LLC ("Algonquin") is seeking approval to proceed with construction of the Algonquin J-2 Expansion Project (the "Project"). The Project consists of a new 2.0 mile loop in the Towns of Medford and Somerville, which will expand the existing Algonquin Gas Transmission ("AGT") J-2 lateral system that serves NSTAR Gas Company's ("NSTAR") Cambridge system. Specifically, the Project involves the construction of 2.0 miles of 14-inch pipeline that loops from the interconnection with the AGT J-1 System at the Mystic tap to an interconnection with NSTAR at the border of Somerville and Cambridge. To assist you in your review, we have provided a U.S. Geological Survey ("USGS") map showing the location of the proposed Project.

Algonquin's intent is to file a formal application for review and approval from the Federal Energy Regulatory Commission ("FERC") and numerous other agencies. The permit proceedings, which will be conducted by these agencies, will provide an opportunity for public input and involvement. The FERC application is currently planned to be filed in the first quarter of 2008. All other agency applications will be filed in a similar time-frame. Algonquin proposes the J-2 Expansion Project facilities to be fully operational by September 2009.

On behalf of Algonquin, PAL requests your review of the attached map to determine if any part of the Project area crosses or is located near areas of traditional, cultural, or religious importance that you are aware of.

If you have any questions or need any additional information, please do not hesitate to contact Gregory R. Dubell, Energy Projects Manager, or me at your convenience.

Public
Archaeology
Laboratory

210 Lonsdale Avenue
Pawtucket, RI 02860
TEL 401.728.8780
FAX 401.728.8784

Sincerely,

Deborah Cox

Deborah C. Cox, RPA
President

/dg

Enclosure

cc: Bill Brett, Algonquin (w/o encl.)

PAL

November 29, 2007

George Green Jr.
Tribal Historic Preservation Officer
Mashpee Wampanoag Tribal Council, Inc.
P.O. Box 1048
483 Great Neck Road South
Mashpee, Massachusetts 02649

Re: Algonquin Gas Transmission, LLC
J-2 Loop Project, Medford and Somerville, MA
PAL #2173

Dear Mr. Green:

Algonquin Gas Transmission, LLC ("Algonquin") is seeking approval to proceed with construction of the Algonquin J-2 Loop Project (the "Project"). The Project consists of a new 2.0 mile loop in the Towns of Medford and Somerville, which will expand the existing Algonquin J-2 lateral system that serves NSTAR Gas Company's ("NSTAR") Cambridge system. Specifically, the Project involves the construction of 2.0 miles of 14-inch pipeline that loops from the interconnection with the Algonquin J-1 System at the Mystic tap to an interconnection with NSTAR at the border of Somerville and Cambridge To assist you in your review, we have provided a U.S. Geological Survey ("USGS") map showing the location of the proposed Project.

Algonquin's intent is to file a formal application for review and approval from the Federal Energy Regulatory Commission ("FERC") and numerous other agencies. The permit proceedings, which will be conducted by these agencies, will provide an opportunity for public input and involvement. The FERC application is currently planned to be filed in the first quarter of 2008. All other agency applications will be filed in a similar time-frame. Algonquin proposes the J-2 Expansion Project facilities to be fully operational by September 2009.

On behalf of Algonquin, PAL requests your review of the attached map to determine if any part of the Project area crosses or is located near areas that may be of traditional cultural or religious importance to the Tribe. On October 17, 2007, PAL sent Shawn Hendricks, Sr., Chairman of the Mashpee Wampanoag Tribe, a similar letter requesting his review of the J-2 Loop Project.

Public
Archaeology
Laboratory

210 Lonsdale Avenue
Pawtucket, RI 02860
TEL 401.728.8780
FAX 401.728.8784

We appreciate your time and look forward to continued consultation with you during the review process. If you have any questions or need any additional information, please do not hesitate to contact Deborah C. Cox, President, or me at your convenience.

Sincerely,

Gregory R. Dubell

Gregory R. Dubell, RPA
Energy Projects Manager

/dg

Enclosure

cc: W. Brett, Spectra (w/o encl.)

PAL

December 3, 2007

George Green, Jr.
Tribal Historic Preservation Officer
Mashpee Wampanoag Tribal Council, Inc.
P.O. Box 1048
483 Great Neck Road South
Mashpee, Massachusetts 02649

Re: Algonquin Gas Transmission, LLC
J-2 Loop Project, Medford and Somerville, MA
PAL #2173

Dear Mr. Green:

On behalf of Algonquin Gas Transmission, LLC ("Algonquin"), enclosed please find a draft of the *Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains*. The procedures define the approach that Algonquin will follow during construction of the J-2 Loop Project in Medford and Somerville.

Your office will be receiving the procedures as part of the FERC filing in January 2008. If you have any questions or require additional information, please do not hesitate to contact Gregory R. Dubell, Energy Projects Manager, or me at your convenience.

Sincerely,

Deborah C. Cox

Deborah C. Cox, RPA
President

/dg

Enclosure

cc: Bill Brett, Algonquin (w/o encl.)

Public
Archaeology
Laboratory

210 Lonsdale Avenue
Pawtucket, RI 02860
TEL 401.728.8780
FAX 401.728.8784

# PAL PHONE DIALOG

Call ID 9032

**I (Name)** Greg Dubell

**Talked with** George Green, Jr. **of** Mashpee Wampanoag Tribe **Ph** 508-477-0208 ext

**Regarding:** **PAL Proj. No.** 2173 **Name** AGT J-2 Loop Project

**Other**

**Date** 12/6/2007 **Time** 10:07 AM **Party Called** ✓ **I Called**

**I said:**

Left voice message asking George Green (THPO) to confirm receipt of notification letter dated 10/17/2007 and whether tribe is interested in consultation.

**Party said:**

**Action Taken:**

**cc:**

**Copy to file**

# Appendix 4B – Cultural Resource Survey Reports

Privileged and Confidential – See Volume IV

Spectra Energy

# Appendix 4C – Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains

# Procedures Guiding the Discovery of Unanticipated Cultural Resources and Human Remains

## J-2 Loop Project

Medford and Somerville, MA.

*April 2008*

Submitted by:
***The Public Archaeology Laboratory, Inc.***
***210 Lonsdale Ave***
***Pawtucket, RI 02860***

---

### Introduction

Algonquin Gas Transmission, LLC ("Algonquin"), a unit of Spectra Energy Transmission ("Spectra"), is committed to the protection and preservation of cultural resources, in accordance with federal and state legislation, and is continuing that commitment as part of the proposed J-2 Loop Project. Algonquin recognizes that despite intensive cultural resource field investigations that are typically performed prior to project construction, or a determination that a particular area exhibits low archaeological sensitivity, it is nonetheless possible that cultural resource deposits could be discovered during project construction or maintenance activities, particularly during excavation. Algonquin also recognizes the requirement for compliance with federal and state regulations and guidelines regarding the treatment of human remains, if any are discovered.

As such, the procedures guiding the unanticipated discovery of cultural resources and human remains detailed herein were developed on behalf of Algonquin and in consultation with the Massachusetts Historical Commission and State Historic Preservation Office ("MHC" and "MA SHPO"), pursuant to Massachusetts General Laws Chapter 7, §38A; Chapter 9, §§26A and 27C; Chapter 38, §6; Chapter 114, §17; and Chapter 272, §§71 and 73, all as amended. They represent the basis of the approach that Algonquin will use to address emergency discoveries of archaeological cultural resources during construction activities within the J-2 Loop Project area of potential effect.

The purpose of archaeological investigations during the planning of natural gas projects is to determine the presence or absence of historic properties within a project area. These archaeological investigations are conducted in accordance with standards set forth in the Federal Energy Regulatory Commission (FERC) Office of Pipeline Regulation's *Guidelines for Reporting on Cultural Resources Investigations* (2002), pursuant to 18 CFR 157.206 and Appendix II of Subpart F, which require actions taken under sections 3 and 7 of the Natural Gas Act (Part 380, Appendix A) to comply with the National Environmental Policy Act of 1969 ("NEPA") and Section 106 of the National Historic Preservation Act of 1966 (16 USC 470f), as amended (1976, 1980, 1992, 1999), and implementing regulations of the Advisory Council on Historic Preservation ("Advisory Council") (36 CFR 800), specifically, those procedures regarding "post-review discoveries" as outlined in 36 CFR 800.13. All work is undertaken pursuant to the *Secretary of the Interior Standards for Archaeology and Historic Preservation* (48 Federal Regulations 44716-42 [1983]) and the applicable laws and regulations pertaining to the cultural resources of Massachusetts.

## Identification/Training

The identification of archaeological resources requires basic training in order to recognize potential sites. Algonquin requires that its employees and contractors have a basic understanding of the nature of cultural resources. As a result, all Algonquin inspectors and construction contractor personnel will be given basic training in cultural resource site recognition.

The purpose of this training will be to review Algonquin's commitments regarding cultural resource compliance and to provide an overview of the general cultural history of each project area, so that both Algonquin and construction personnel will be aware of the kinds of archaeological resources that may be encountered in the field. In addition, the training program will emphasize the exact procedures to be followed, as outlined in this plan, regarding actions to be taken and notification required in the event of a significant site discovery, such as a discovery of human remains, during construction. The Massachusetts Historical Commission's (MHC) fact sheet entitled "Know How #4 *What to do when Human Burials are Uncovered* will be distributed.

The training will be designed to ensure that Algonquin personnel and construction contractors understand the extent of the archaeological survey program that has been performed for the project and are fully aware of the distinction between sites that has been located and "cleared" under the cultural resource program (i.e., determined to be non-significant after different levels of investigation or sites that have already undergone data recovery) and new discoveries during the construction process.

## Notification Procedures

### *During Construction*

Algonquin is committed to the protection and preservation of cultural resources, in accordance with federal and state legislation. Algonquin recognizes that – despite the intensive cultural resource field investigations that are typically performed prior to project construction – it is nonetheless possible that previously unknown cultural resource sites could be discovered during the project construction process, particularly during excavation activities. Algonquin recognizes the requirement for strict compliance with federal and state regulations and guidelines regarding the treatment of human remains, if any are discovered. The following details the plan that will be followed in the event that new cultural resource sites or human remains are discovered during the construction process.

### Archaeological Discoveries

The following procedures will be adhered to in the event of a potential discovery of archaeological remains during construction.

1. Possible archaeological remains may be discovered by Algonquin or contractor construction personnel. In the event that suspected artifacts are uncovered during a construction activity, that activity shall immediately be halted until it can be determined whether that materials are cultural and, if so, whether they represent a potentially significant site.

If artifacts are identified by contractor construction personnel, activities that could affect the integrity of the deposit(s) will be suspended immediately and the contractor's construction foreman will be notified immediately. The foreman, in turn, will notify Algonquin's chief inspector. Notification will include the specific construction area (e.g., trench wall, spoil pile, foundation excavation) in which the potential site is located.

If deposits are identified by Algonquin personnel, they will direct the contractor to stop work on activities that could affect the integrity of the resource, and will inform Algonquin's Environmental Affairs Department.

2. Upon notification or discovery of a possible site, Algonquin will contact its cultural resource consultants who will in turn be responsible for determining whether a visit to the area is required. If a site visit is necessary, the archaeologist will have a crew on site within 24 hours after notification.

   The location of any site-related materials, features, *etc.*, will be identified on Algonquin maps, along with the data on which they were identified.

   **Note:** Cultural material or features discovered within a previously recorded site location can be unrelated to the originally identified deposit and therefore have the potential to be classified as a new site, requiring new survey investigations.

3. If on-site archaeological investigations are required, the Algonquin chief inspector will inform the construction contractor. No construction work at the site that could affect the artifacts will be performed until the archaeologists review the site. The site will be flagged as being off-limits for work, but will not be identified as an archaeological site *per se* in order to protect the resources.

4. The archaeologists will conduct a review of the site and, in consultation with the FERC, SHPO, and THPO(s), will survey the site as necessary, in accordance with MA SHPO standards and guidelines. Since the area will have already been partially disturbed by construction activities, the objective of any cultural resource investigations will be to evaluate data quickly so that FERC/SHPO/THPO(s) notifications are made and consultation can proceed.

5. The archaeologists will determine, based on the deposits found and on the cultural sensitivity of the area in general, whether the site is potentially significant and whether the FERC and the MA SHPO require immediate notification by telephone. If not, data regarding the site will be faxed or sent by express mail to the FERC and the MA SHPO in order to ensure a quick site clearance.

6. Algonquin and its archaeologists will work with the FERC and the SHPO to ensure that a treatment plan for the site is developed and implemented in as timely a fashion as possible.

## Human Remains Discoveries

If any human remains are to be encountered, they will likely be discovered in excavations, possibly below areas tested by standard survey techniques.

The treatment of any human remains encountered during Algonquin projects will be guided by the policy statement adopted by the Advisory Council on Historic Preservation ([Advisory Council]; see *Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects*, Advisory

Council February 23, 2007), and by the relevant state laws and guidelines. The Advisory Council policy statement recommends that, when burial sites, human remains, or funerary objects will be or are likely to be encountered in the course of Section 106 review, a federal agency should adhere to the following principles:

> **Principle 1:** Participants in the Section 106 process should treat all burial sites, human remains, and funerary objects with dignity and respect.
>
> **Principle 2:** Only through consultation, which is the early and meaningful exchange of information, can a federal agency make an informed and defensible decision about the treatment of burial sites, human remains, and funerary objects.
>
> **Principle 3:** Native Americans are descendants of original occupants of this country. Accordingly, in making decisions, federal agencies should be informed by and utilize the special expertise of Indian tribes and Native Hawaiian organizations in the documentation and treatment of their ancestors.
>
> **Principle 4:** Burial sites, human remains, and funerary objects should not be knowingly disturbed unless absolutely necessary, and only after the federal agency has consulted and fully considered avoidance of impact and whether it is feasible to preserve them in place.
>
> **Principle 5:** When human remains or funerary objects must be disinterred, they should be removed carefully, respectfully, and in a manner developed in consultation.
>
> **Principle 6:** The federal agency is ultimately responsible for making decisions regarding avoidance of impact to or treatment of burial sites, human remains, and funerary objects. In reaching its decisions, the federal agency must comply with applicable federal, tribal, state, or local laws.
>
> **Principle 7:** Through consultation, federal agencies should develop and implement plans for the treatment of burial sites, human remains, and funerary objects that may be inadvertently discovered.
>
> **Principle 8:** In cases where the disposition of human remains and funerary objects is not legally prescribed, federal agencies should proceed following a hierarchy that begins with the rights of lineal descendants, and if none, then the descendant community, which may include Indian tribes and Native Hawaiian organizations.

The procedures that will be followed in the event that human remains are discovered during construction of Algonquin projects are as follows:

1. If any personnel on the construction site identify human remains, all construction work in the immediate vicinity of the site that could affect the integrity of the remains will cease immediately. The remains should not be touched, moved, or further disturbed.

2. Algonquin project manager will be informed immediately and notified of the exact location of the remains, as well as of the time of discovery, and in turn will be responsible for immediately contacting Algonquin's archaeological consultant.

3. The archaeologist and Algonquin will be responsible for notifying appropriate FERC personnel as well as the SHPO, the Office of the Chief Medical Examiner (OCME) and the State Police. If the cultural resources consultant determines that the remains are obviously human and recent, this should be indicated to the contact, including the OCME. If the cultural resources consultant considers that the remains appear to be over 100 years old, this should also be indicated to the

OCME, and the cultural resources consultant should also inform the State Archaeologist so that these two officials can coordinate and respond.

4. The FERC and the SHPO will consult with the property owner and the Commission on Indian Affairs if the remains are Native American, to discuss whether there are prudent and feasible alternatives to protect the remains. The results of this consultation will be made in writing. If it is not possible to protect the remains, they may be excavated only under a Special Permit (950 CMR 70.20[2]) granted by the State Archaeologist after review of an adequate data recovery plan that specifies a qualified research team and an appropriate research design (950 CMR 70.11[2]), including a proposal for disposition of the remains. Analyses to be performed on Native American remains will be discussed in consultation with the Commission on Indian Affairs. After analyses, Native American remains will be returned to the Commission on Indian Affairs for disposition. Non-native remains will be treated in accordance with MHC's policy and guidelines of February 14, 1990.

5. In all cases, due care will be taken in the excavation and subsequent transport and storage of the remains to ensure that the sacred meaning of the remains for Native Americans are respected and protected, as required.

**Applicable State Laws**

Massachusetts General Laws, Chapter 38, Sections 6B & 6C; Chapter 9, Sections 26-27C (950 CMR 70-71); Chapter 7, Section 38A; Chapter 114, Section 17; all as amended.

**List of Contacts**

Federal Energy Regulatory Commission
Office of Pipeline Regulation
825 N. Capitol Street, N.E.
Washington, DC 20426
**Contact**: Archaeologist
Environmental Review and Compliance Branch II
Tel: (202) 502-8613
Fax: (202) 219-0205

Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, Massachusetts 02125
**Contact**: Brona Simon, State Archaeologist/State Historic Preservation Officer
Tel: (617) 727-8470
Fax: (617) 727-5128

Commission on Indian Affairs
Massachusetts Commission on Indian Affairs
1 Congress Street, 10th Floor
Boston, MA 02114
**Contact**: Jim Peters, Executive Director
Tel: (617) 573-1292
Fax: (617) 573-1515

Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535
**Contact**: Cheryl Andrews-Maltais, Tribal Historic Preservation Officer
Tel: (508) 645-9265
Fax: (508) 645-3790

Mashpee Wampanoag Indian Tribal Council, Inc.
483 Great Neck Road South
Mashpee, Massachusetts 02649
**Contact**: George Green, Jr., Tribal Historic Preservation Officer
Tel: (508) 477-0208
Fax: (508) 477-1218

State Office of the Chief Medical Examiner
720 Albany Street
Boston, Massachusetts 02118
**Contact:** Dr. Ann Marie Mires, Forensic Anthropologist
Tel: (617) 267-6767 (ext. 176)
Fax: (617) 266-6763

Massachusetts State Police Barracks, Station A-4
520 Fellsway
Medford, Massachusetts 02155
**Contact:** Tel: (781) 396-0100

# ALGONQUIN GAS TRANSMISSION, LLC

# J-2 LOOP PROJECT

## *Resource Report 5*

## *Socio-Economics*

# RESOURCE REPORT 5 – SOCIO-ECONOMICS
# FERC ENVIRONMENTAL CHECKLIST

| Part 380 – Minimum Filing Requirements for Environmental Reports | Company Compliance or Inapplicability of Requirement |
|---|---|
| For major aboveground facilities and major pipeline Projects that require an EIS, describe existing socioeconomic conditions within the Project area. (§ 380.12 (g)(1)). | Not applicable |
| For major aboveground facilities, quantify impact on employment, housing, local government services, local tax revenues, transportation, and other relevant factors within the Project area. (§ 380.12 (g)(2 – 6)). | Not applicable |

# 5.0 SOCIO-ECONOMICS

The Project does not involve significant aboveground facilities such as conditioning or liquefied natural gas (LNG) plants. The Project scope is minor in nature and involves the construction of approximately 2 miles of new 14” diameter pipeline in Medford and Somerville, MA. Based on the type and minimal extent of potential environmental and residential impacts as well as the absence of significant or controversial issues identified to date, the requirement for an Environmental Impact Statement is not anticipated. Therefore, in accordance with Federal Energy Regulatory Commission (FERC) guidance provided in 18 Code of Federal regulations (CFR) Part 380.12(g), Resource Report 5 addressing socio-economic conditions and impacts in the Project area is not required.

Resource Report 1 (General Project Description) describes estimated workforce requirements in accordance with FERC guidance provided in 18 CFR Part 380.12(c). This information includes average workforce requirements, number of construction spreads, estimated duration of construction and number of personnel to be hired to operate the Project.

Spectra Energy

# ALGONQUIN GAS TRANSMISSION, LLC

## J-2 LOOP PROJECT

*Resource Report 6*

## *Geological Resources*

# RESOURCE REPORT 6 – GEOLOGICAL RESOURCES
# FERC ENVIRONMENTAL CHECKLIST

| **Part 380 – Minimum Filing Requirements for Environmental Reports** | **Company Compliance or Inapplicability of Requirement** |
|---|---|
| Identify the location (by milepost) of mineral resources and any planned or active surface mines crossed by the proposed facilities. (§ 380.12 (h)(1 and 2)). | Section 6.3<br>Table 6.3-1 |
| Identify any geologic hazards to the proposed facilities. (§ 380.12 (h)(2)). | Section 6.4 |
| Discuss the need for and locations where blasting may be necessary in order to construct the proposed facilities. (§ 380.12 (h)(3)). | Section 6.2<br>Table 6.1-1 |
| For LNG Projects in seismic areas, the materials required by "Data Requirements for the Seismic Review of LNG Facilities," NBSIR84-2833. (§ 380.12 (h)(5)). | Not Applicable |
| For underground storage facilities, how drilling activity by others within or adjacent to the facilities would be monitored, and how old wells would be located and monitored within the facility boundaries. (§ 380.12 (h)(6)). | Not Applicable |

## TABLE OF CONTENTS

6.0 GEOLOGICAL RESOURCES ........ 1
6.1 GEOLOGIC SETTING ........ 1
6.1.1 Surficial Geology ........ 2
6.1.2 Bedrock Geology ........ 2
6.2 BLASTING ........ 2
6.3 MINERAL RESOURCES ........ 3
6.4 GEOLOGIC HAZARDS ........ 3
6.4.1 Earthquakes ........ 3
6.4.2 Active Faults ........ 3
6.4.3 Subsidence ........ 4
6.4.4 Landslides ........ 4
6.4.5 Volcanism ........ 4
6.4.6 Avoidance and Minimization of Adverse Effects ........ 4
6.5 PALEONTOLOGY ........ 5
6.6 LNG FACILITIES IN SEISMIC RISK AREAS ........ 5
6.7 LITERATURE CITED ........ 5

## TABLES

6.1-1 Geologic Conditions within the Proposed J-2 Loop Project Alignment ........ 1

## LIST OF FIGURES

Please Refer to Appendix A

6.1-1 Algonquin J-2 Loop Project Surficial Geology
6.4-1 Algonquin J-2 Loop Project Seismic Zones
6.4-2 Algonquin J-2 Loop Project Landslide Potential

# 6.0 GEOLOGICAL RESOURCES

This Resource Report describes the geologic resources crossed by the proposed J-2 Loop Project in Somerville and Medford, Massachusetts. Specifically, this Resource Report identifies potential impacts of the proposed Project on geologic resources within the Project corridor and identifies geologic hazards that may potentially affect construction and operation of the pipeline or that may place the public at risk. Where appropriate, mitigation measures have been included that are intended to reduce the impact of the Project on geological resources.

## 6.1 GEOLOGIC SETTING

Massachusetts was formed from a Precambrian basement distinguished by local fault basins of Eocambrian to Jurassic strata and an offshore apron of Cretaceous and Tertiary deposits. All of these strata are generally masked by a thin mantle of glacial deposits. The four major terrains of metamorphic and granite rock comprising the basement record a plate collision between Grenville-age North America and northwestern proto-Africa (Barosh and Miller 2006).

The proposed Algonquin J-2 System natural gas pipeline Project is located within the Appalachian Highlands physiographic region, which is an ancient mountain system that runs on a north-south axis. The Project area is within the New England Province, Seaboard Lowland Section. The Seaboard Lowland Section is relatively low in elevation, with topographic relief limited to less than 200 feet in most places. This province is described as containing small streams and rivers that generally flow toward the coast along the land-surface slope (Flanagan et al. 1998). The Project is located adjacent to the Mystic River and the pipeline alignment ranges from approximately 2-10 feet in elevation.

**TABLE 6.1-1**
**GEOLOGIC CONDITIONS WITHIN THE PROPOSED J-2 LOOP PROJECT ALIGNMENT**

| Project Component | GEOLOGY | | BEDROCK | GEOLOGIC HAZARDS |
|---|---|---|---|---|
| | Physiographic Province | Geological Formation/ Stratigraphic Unit | Mileposts of Shallow Bedrock[a] | Mileposts of Severe Erosion Potential[b] |
| Pipeline | New England Province<br>Seaboard Lowland Section | Fine-grained deposits and glacial till | None | None |
| Valve Site | New England Province<br>Seaboard Lowland Section | Fine-grained deposits and glacial till | None | None |

[a] Areas of shallow bedrock are those with bedrock within five feet from the surface. See Table 7.1-1 for soil series information, including depth to bedrock, for the soils crossed by the Project. Blasting may be necessary in these areas and will be carried out according local, state and federal blasting regulations (see Section 6.2).

[b] Area of soil that contain severe erosion potential. See Table 7.1-1 for soil series information, including erosion potential and erosion hazard, for the soils crossed by the Project.

### 6.1.1 Surficial Geology

A review of the MassGIS Surficial Geology datalayer indicates that the surficial geology in the Project area is characterized by till or bedrock. Fine grained deposits are also identified within the vicinity of the Project area (MassGIS 1999). Of note, however, is that the proposed pipeline will be located within existing roadways and will not cross or be within the vicinity of existing undisturbed areas. Consultation with the Massachusetts State Geologist indicated that the proposed pipeline alignment passes primarily through fine-grained deposits and glacial till. The fine-grained deposits are most likely Boston Blue Clay and may be sensitive to vibration (Mabee 2007).

### 6.1.2 Bedrock Geology

According to the Bedrock Geologic Map of Massachusetts and the MassGIS Bedrock lithology datalayer, the proposed pipeline alignment is located within New England Coastal bedrock lithology drainage basin, Avalon Belt Geologic Province (MassGIS 2004). The Avalon Province is localized in eastern Massachusetts, coastal Connecticut, and Rhode Island. The province is characterized primarily by Precambrian Z granite and graphitic gneiss and metasedimentary rocks of Precambrian Z to Ordovician age (Robinson and Kapo 2003).

The Group A general bedrock lithology is characterized by Metamorphic Rocks Undivided and the Group B detailed category is Pelitic Rocks (MassGIS 2004). Metamorphic rocks are characterized by pelitic schist and phyllite, and low to moderate sensitivity to acid deposition. Pelitic rocks are characterized by graphitic and sulfidic slate and grewacks and may contain minor amounts of calc-silicate rock, pyrite and variable amounts of organic materials, which are sufficient to cause a rusty-weathering characteristic (Robinson and Kapo 2003).

The Massachusetts State Geologist indicated that the entire pipeline alignment will pass through argillite as mapped on Kaye's 1980 Miscellaneous Field Studies Map 1241 of the Boston basin. Argillite is mildly metamorphosed shale of Pre-Cambrian Age (Mabee 2007).

## 6.2 BLASTING

Medford and Somerville are highly urban areas and are therefore categorized by densely populated and developed areas. The Project area for the proposed pipeline is within existing traffic roadways. Further, because of the developed nature of the Project area, no areas with shallow depth to bedrock have been identified along the proposed pipeline alignment. Therefore, no blasting is anticipated to be required for the J-2 Loop Project.

However, in the rare event that Algonquin determines that blasting is necessary for the proposed Project, Algonquin will obtain state and municipal approvals associated with proposed blasting prior to the commencement of construction. In accordance with the Code of Massachusetts Regulations 527 CMR 13, the entity conducting blasting must hold a valid and current Massachusetts Blasters License issued by the State Fire Marshall's Office. Any Project-related blasting specifications will meet or exceed applicable federal, state and local requirements governing the use of explosives.

## 6.3 MINERAL RESOURCES

Sand and gravel are the primary mineral resources produced in Massachusetts, and the most important sources of sand and gravel are generally associated with glacial moraines (USGS 2005). Given the urban nature of the Project area, no geologic resources are mined either in or within the vicinity of the Project area.

## 6.4 GEOLOGIC HAZARDS

This section provides information on potential geologic hazards in the vicinity of the proposed Project. Potential geologic hazards considered for this section include earthquakes and active faults, areas susceptible to soil liquefaction, areas of potential ground failure including landslides and slope movement, karst features (areas which possess a topography peculiar to and dependent upon underground solution and the diversion of surface waters to underground routes), sinkhole formations and volcanism.

### 6.4.1 Earthquakes

Review of the *Earthquake Activity in New England and the Northeastern United States* (Ebel and Kafka 1991) map provided by the Weston Observatory indicates that three earthquakes were registered in the southern Greater Boston area of eastern Massachusetts between 1534 and 1992. According to the map, one of the earthquakes recorded registered a magnitude of 2.0 to 2.9; the other two earthquakes registered magnitudes of 3.0 to 3.9. Review of the *Seismicity of Massachusetts* map (USGS 2003) indicates that no earthquakes were registered in the area between 1977 and 2001.

The majority of Massachusetts is located within Seismic Zone 4 based on USGS mapping (see Figure 6.4-1 in Appendix A). From this, the peak acceleration (levels of horizontal shaking) in this area is not expected to be more than 4% of gravity, with only a 10% probability of exceedance in 50 years (USGS 2003). The northeast portion of the state is located within an area that is more sensitive to seismic activity (Zone 5) while the southwestern and southeastern portions of Massachusetts exhibit a lower seismic probability (Zone 3). The proposed J-2 Loop Project is located within Zone 3.

### 6.4.2 Active Faults

Consultation with the Massachusetts State Geologist indicated that several faults cross the Project corridor (Mabee 2007). Review of USGS recent earthquake information does not reveal any recent activity along the identified faults (USGS 2007b). Based on USGS seismic hazard mapping and lack of active faults near the Project area, the seismic risk to the proposed pipeline alignment should be low. In addition, the J-2 Loop Project would be constructed in proximity to an existing natural gas transmission pipeline which has not experienced any problems relating to seismic activity.

### 6.4.3 Subsidence

Subsidence is a significant geologic hazard in areas where bedrock is predominately limestone or dolomite. The Massachusetts State Geologist indicated that, although there is no karst or mining activities that would pose a ground subsidence hazard, slumping and sloughing of excavations in the blue clay may occur. Excavations in till may also produce some minor slumping depending on water content especially during heavy rains or extended wet periods. However, the implementation of good housekeeping techniques throughout construction should alleviate this potential issue (Mabee 2007).

### 6.4.4 Landslides

Susceptibility to landsliding is often defined as the probable degree of response of areal rocks and soils to natural or artificial cutting or loading of slopes, or to anomalously high precipitation. Based upon review of the digitally compiled Landslide Overview Map of the Conterminous United States (Radbruch-Hall et al. 1982), the area of the proposed pipeline alignment is located within a low landslide incidence area (less than 1.5% of area involved) and within an area with a "low susceptibility" to landslides (See Figure 6.4-2 in Appendix A). The map indicates that, in Lower New England,

> "Coastal New England, except for Cape Cod, is a rocky terrain with a highly irregular shoreline. Away from the coast, the land is rolling, and the outcrops are interspersed with ground moraine. Pleistocene marine clay is extensive along lowlands in eastern Maine and New Hampshire. The clay is unstable, and on the steep slopes adjacent to major streams, numerous large areas are susceptible to small slumps and earth flows. Slope failures occur in clays along the Connecticut River in Vermont, Massachusetts, Connecticut, and in clay near Portland, Maine. Numerous small patches of glacial-lake clay in this physiographic subdivision, which are too small to show on the map, generally have low relief, so that slope failures result from excavations rather than natural causes."

The Project area is primarily flat and is an urban area with little to no natural relief. Based on the information presented above, the proposed Project alignment is in an area of low susceptibility to low incidence for landslides.

### 6.4.5 Volcanism

No active volcanoes or igneous thermal activity are present in Middlesex County (Mabee 2007).

### 6.4.6 Avoidance and Minimization of Adverse Effects

Impacts to geologic resources are expected to be nominal. The potential for damage to the pipeline due to subsidence or other possible geologic hazards will be minimized through routine inspection of the pipeline. The potential for slope failure due to earthflow along the proposed ROW would be minimized through specialized construction techniques and the use of erosion control procedures outlined in the FERC Plan and Procedures (See Appendix C) and Algonquin's E&SCP (See Appendix D).

The proposed Project is not expected to be affected by seismic activity due to the low probability and low incidence/susceptibility of significant magnitude earthquakes within the Project area. Algonquin will comply with all applicable regulations regarding pipe wall thickness and strength.

Although blasting is not anticipated, excavation and trenching procedures would be conducted in compliance with all applicable federal, state, and local laws, codes and regulations. Topographic impacts would be limited to temporary alteration of terrain during construction of the proposed Project. Based upon specific site conditions, slopes may be re-contoured to ensure safe working conditions. Upon completion of pipe installation, disturbed areas and drainage patterns would be restored to pre-construction contours and elevations. Revegetation of the ROW in accordance with FERC's Plan would ensure that the disturbed areas are stabilized to prevent erosion. Construction and restoration activities would be monitored throughout the process to ensure compliance. Operation and maintenance activities would include routine revegetation monitoring as a standard operational procedure.

## 6.5 PALEONTOLOGY

No paleontological resource areas have been mapped in Massachusetts nor does the State Office of Geology have any GIS data layers containing paleontological information (Mabee 2007).

## 6.6 LNG FACILITIES IN SEISMIC RISK AREAS

There are no LNG facilities associated with the proposed J-2 Loop Project.

## 6.7 LITERATURE CITED

Barosh, Patrick J., and Miller, Bradford A. 2006. Geology of Massachusetts. AEG annual meeting. Boston, 2006 URL: http://www.aegweb.org/i4a/pages/index.cfm?pageid=3964. [Accessed November 6, 2007].

Ebel, J.E. and A.L. Kafka. 1991. Earthquake Activity in the Northeastern United States, in Neotectonics of North America, D.B. Slemmons, E.R. Engdahl, M.D. Zoback, and D.D. Blackwell, eds., Geological Society of America.

Flanagan S.M, Nielson M.G, Robinson K.W, and Coles J.F. 1998. WRI 98-4249: Water quality assessment of the New England Coastal Basins in Maine, Massachusetts, New Hampshire, and Rhode Island: Environmental settings and implications for water quality and aquatic biota. USGS Water Resources Investigation Report 98-4249.

Mabee, S.B. 2007. Letter correspondence between Stephen Mabee, Office of the Massachusetts State Geologist and John Zimmer, ENSR on November 1, 2007

MassGIS. 1999. Surficial Geology. [Online WWW] Available URL: http://www.mass.gov/mgis/sg.htm. [Accessed July 2007].

MassGIS. 2004. Bedrock Lithology. January 2004. [Online WWW] Available URL: http://www.mass.gov/mgis/bedlith.htm. [Accessed July 2007].

Mystic River Watershed Association. 2007. Mystic Action Plan. [Online WWW] Available URL: http://www.mysticriver.org/publications/ActionPlan.html. [Accessed July 2007].

Radbruch-Hall, D.H., R.B. Colton, W.E. Davies, I. Lucchitta, and D.J. Varnes. 1982. Digital compilation of Landslide overview map of the conterminous United States. United States Geological Survey.

Robinson Jr, G.R. and Kapo, KE. 2003. USGS Generalized Lithology and Lithogeochemical Character of Near-Surface Bedrock in the New England Region. USGS Digital Open File Report 03-225

United States Geological Survey. 2003. Seismicity map of Massachusetts 1990-2001. [Online WWW]. Available URL: http://earthquake.usgs.gov/regional/states/massachusetts/seismicity.php [Accessed July 12, 2007]

United States Geologic Survey. 2005. Mineral Commodity Summaries, 2005. [Online WWW]. Available URL: http://www.nma.org/pdf/m_value_rank.pdf#search='nonfuel%20mineral%20production%20in%20massachusetts. [Accessed July 12, 2007]

United States Geological Survey. 2007a. Boston Harbor Drainage Basin – Surface Waters. [Online WWW]. Available URL: http://ma.water.usgs.gov/basins/bostonhsfw.htm. Last modified January 31, 2007. [Accessed July 2007].

United States Geological Survey. 2007b. Recent Earthquakes in the Northeastern U.S. [Online WWW]. Available URL: http://www.ldeo.columbia.edu/LCSN/recenteqs/Maps/71-43.html. [Accessed November 14, 2007].

Spectra Energy

# ALGONQUIN GAS TRANSMISSION, LLC

## J-2 LOOP PROJECT

## *Resource Report 7*

## *Soils*

# RESOURCE REPORT 7 – SOILS
# FERC ENVIRONMENTAL CHECKLIST

| Part 380 – Minimum Filing Requirements for Environmental Reports | Company Compliance or Inapplicability of Requirement |
|---|---|
| Identify, describe, and group by milepost the soils affected by the proposed pipeline and aboveground facilities. (§ 380.12 (i)(1)). | Section 7.1.1<br>Table 7.1-1 |
| For aboveground facilities that would occupy sites over 5.0 acres, determine the acreage of prime farmland soils that would be affected by construction and operation. (§ 380.12 (i)(2)). | N/A |
| Describe, by milepost, potential impacts on soils. (§ 380.12 (i)(3 and 4)). | Section 7.2<br>Table 7.1-1 |
| Identify proposed mitigation to minimize impact on soils, and compare with the staff's Upland Erosion Control, Revegetation and Maintenance Plan. (§ 380.12 (i)(5)). | Section 7.3 |

# TABLE OF CONTENTS

7.0 SOILS ..... 1
7.1 PIPELINE ..... 1
7.1.2 Soil Series ..... 3
7.2 CONSTRUCTION AND OPERATION IMPACTS ..... 4
7.2.1 Agricultural Land ..... 5
7.2.2 Hydric Soils ..... 5
7.2.3 Shallow Depth to Bedrock ..... 5
7.2.4 Severe Erosion ..... 6
7.3 CROPLAND AND RESIDENTIAL IMPACTS ..... 6
7.4 MITIGATION ..... 6
7.4.1 Erosion Control ..... 6
7.4.2 Revegetation ..... 7
7.5 LITERATURE CITED ..... 7

## TABLES

7.1-1 Soil Associations and Series Crossed by the J-2 Loop Project ..... 2
7.1-2 Characteristics of Soil Series Associated with the J-2 Loop Project ..... 4

## FIGURES

7.1-1 Algonquin J-2 Loop Project - Pipeline Alignment SSURGO Soils

# 7.0 SOILS

Resource Report 7 identifies, describes, and lists by mileposts, the soils affected by the proposed Project and its associated facilities. This report characterizes soils traversed by the Project based on US Department of Agriculture ("USDA") Natural Resource Conservation Service ("NRCS") Soil Surveys Information for Middlesex County, Massachusetts. Soil information for Middlesex County was obtained by the Soil Survey of Middlesex County, Massachusetts, published by the Middlesex Conservation District in July, 1995.

Resource Report 7 is organized into five sections. Section 7.1 describes the soils traversed by the proposed pipeline. Section 7.2 provides a description of the potential impacts of the Project on soil resources. Section 7.3 provides a description of the potential impacts of the Project on cropland and residential land. Section 7.4 presents mitigation measures proposed to minimize soil impacts, and Section 7.5 lists references used in the preparation of this report.

## 7.1 PIPELINE

The pipeline alignment crosses six different soil map units that are described below and identified by milepost in Table 7.1-1. Soil map units presented in this resource report are phases of various soil series, associations and complexes. Soil series are groups of soils having similar parent material such as glacial till, loess or alluvium and are differentiated mainly on the basis of significant variations in morphological features of the soil profile.

Algonquin does not expect to encounter soils that may cause potential limitations during construction given the highly disturbed nature of the soils identified within the Project area. Potential soil limitations that could arise are identified by soil map unit and milepost and presented within Table 7.1-1.

The brief description of each soil series crossed by the proposed pipeline is based on the Official Soil Series Descriptions prepared by the USDA NRCS (USDA 1993).

### TABLE 7.1-1
### SOIL ASSOCIATIONS AND SERIES CROSSED BY THE J-2 LOOP PROJECT

| County | Milepost | Soil Series | Surface Texture | Erosion Potential | Hydrologic Group[1] | Drainage Characteristics[2] |
|---|---|---|---|---|---|---|
| Middlesex | 0.0 - 0.56<br>0.59 - 0.63<br>0.64 - 1.55 | Urban land wet stratum | Not Rated | Not Rated | N/A | N/A |
| | 1.99 - 2.18 | Newport-urban land complex | Not Rated | Not Rated | N/A | N/A |
| | 1.55 - 1.99<br>2.18 - 2.19 | Urban Land | Not Rated | Not Rated | N/A | N/A |
| | 0.56 – 0.59<br>0.63 – 0.64 | Udorthents wet substratum | Not Rated | Not Rated | B | N/A |

Source: http://www.mass.gov/mgis/soi.htm. USDA (1993).

1: Hydrologic group A indicates that the soil has a high infiltration rate; group B indicates that the soil has a moderate infiltration rate; group C indicates that the soil has a slow infiltration rate. Soils with "NA" indicate that, given the highly disturbed nature of the soil, the data to evaluate the infiltration rate was not available.

2: Soils with "NA" means the data was not applicable.

### 7.1.2 Soil Series

In general, soils that exhibit similar horizon composition, thickness, and arrangement make up a series. The layout of these series on the landscape provides useful information, such as drainage class and geologic origin. Series can be subdivided into map units, or phases, with similar physical and chemical properties that can affect the management of a soil. These properties can include slope, stoniness, acidity, wetness, and depth to bedrock. Series and phases are used together to classify and map specific soil types on a landscape.

The proposed pipeline alignment crosses four different soil series. The distribution of soil series along the pipeline alignment is shown on Figure 7.1-1 and listed by MP in Table 7.1-1. Each soil series crossed by the proposed J-2 Loop Project is described below and is further characterized (i.e., depth to water table, flooding frequency) in Table 7.1-2.

*Urban land – wet substratum*

This soil series is composed of areas where the soil has been altered or obscured by buildings, industrial areas, paved parking lots, sidewalks, roads and railroad yards. These structures cover 75% or more of the surface area. Generally, these areas previously existed as tidal marsh, floodplains, bays, harbors or swamps that have been filled. Slopes in these areas range from nearly level to steep.

*Urban land*

This soil series is identical to the urban land – wet substratum in that the soils have been altered or obscured by buildings, industrial areas, paved parking lots, sidewalks, roads and railroad yards, where these structures cover 75% or more of the surface area. The urban land soil series differs from the urban land – wet substratum series only in that the urban land areas did not previously exist as tidal marsh, floodplains, bays, harbors, or swamps.

*Newport – urban land complex. 3 to 15 percent slopes*

This soil series consists of undulating and rolling, very deep, well drained Newport soils and areas of urban land in the Boston basin. Although urban land development has altered the soils and landscapes in these areas, the soil can be identified at widely separated points, and the general nature of the areas can be determined. Broad delineations of this soil series have been made on the Middlesex County Soil Survey Map, and this map unit consists of about 50 percent urban land and about 35 percent Newport soils and about 15 percent other soils.

Newport soils consist of gently sloping to very steep, deep, dark-colored, well drained soils on drumlins in the Boston Basin. They formed in compact glacial till and have friable silt loam surface soil and subsoil with moderate permeability over a firm or very firm fine sandy loam to loam substratum at a depth of 15 to 30 inches which has slow or very slow permeability. Newport soils have a very stony surface except where stones have been removed, and have stones below the surface. Major limitations with the Newport soil series are related to slow permeability in the substratum, slope and stoniness.

*Udorthents – wet substratum*

Udorthents – wet substratum consist of gently sloping areas that were previously tidal marsh, flood plains, bays, harbors and swamps that have been filled. Fill consists of various types of soil material, rubbish and refuse. Depth of fill ranges from two to 20 feet or more.

**TABLE 7.1-2**
**CHARACTERISTICS OF SOIL SERIES ASSOCIATED WITH THE J-2 LOOP PROJECT**

| Map Unit | Milepost | Soil Series | Slope (%) | Depth to Seasonal Mean High Water Table (centimeters) | Flooding Frequency[1] | Depth to Bedrock (centimeters) |
|---|---|---|---|---|---|---|
| 603 | 0.0 - 0.56<br>0.59 - 0.63<br>0.64 - 1.55 | Urban land wet substratum | NA | > 200 | 0 | > 200 |
| 627C | 1.99 - 2.18 | Newport urban land | 3 – 15% | 61 | 0 | 61 |
| 602 | 1.55 - 1.99<br>2.18 - 2.19 | Urban land | NA | > 200 | 0 | > 200 |
| 655 | 0.56 – 0.59<br>0.63 – 0.64 | Udorthents wet substratum | NA | > 200 | 0 | > 200 |

Source: USDA (1995).
[1] A flooding frequency of 0 indicates that the area floods less than once every 500 years
NA – Not Applicable

## 7.2 CONSTRUCTION AND OPERATION IMPACTS

Pipeline construction activities generally result in temporary, minor soil impacts so long as proven Best Management Practices ("BMPs") are incorporated into the Project design and implemented properly from the start of construction until final stabilization is achieved. Impacts to soils result from clearing, grading, trench excavation and by heavy machinery traveling along the right-of-way during pipeline construction. Potential impacts include reduction of soil quality from the intermixing of topsoil and subsoil and soil settling or slumping. The soil resource impacts will occur only during the construction period and/or post-construction monitoring period. Depending on soil conditions, these impacts can include loss of excavated soil from water and wind erosion, soil compaction from construction equipment, and mixing of wetland topsoil and subsoil. The characteristics of soil types, vegetative cover and slope are important factors in determining whether the potential exists for these construction-related impacts to occur. Table 7.1-2 lists the slope, depth to seasonal high water table, erodibility of the surface horizon, and depth to bedrock of each soil type affected by the Project.

To minimize potential soil impacts, Algonquin will construct the pipeline in accordance with FERC's Plan and Procedures (Appendix C) and Algonquin's E&SCP (Appendix D). These documents identify erosion control measures designed to reduce potential short-term and long-term impacts on soil and water resources including installing, temporary sediment barriers and permanent trench breakers; and the stabilization of exposed surfaces through revegetation and mulching.

Additionally, Algonquin prescribes the use of erosion control devices and construction practices that will minimize erosion during and after construction. During construction, erosion control structures, temporary seeding and revegetation, and erosion control fabrics will be used. After construction is complete, Algonquin will minimize further erosion by re-grading and reseeding the disturbed areas. Following restoration and clean up, Algonquin will monitor the disturbed areas to maintain erosion control structures and repair any erosion caused as a result of the pipeline installation.

The Project does not traverse soils with a severe potential for soil compaction (agricultural land). An examination of the soil surveys information showed that depth to bedrock is greater than five feet through the majority of the Project area; therefore, the probability of the introduction of rock into the topsoil is low (See Table 7.1-1). The following subsections describe the nature of the potential soils-related limitations issues in the Project area.

### 7.2.1 Agricultural Land

No portion of the Project alignment is located within agricultural land.

### 7.2.2 Hydric Soils

The depth to the seasonal mean high water table indicates the average depth of the water table from the ground surface. High water tables have an impact on trenching design and construction. High water tables at or near the surface also generally coincide with the location of hydric soils, which are indicative of wetland hydrology. As depicted on Figure 7.1-1 (USDA 1993), no portions of the pipeline alignment contain soils with a seasonal high water table within 12 inches of the ground surface and, therefore, impacts associated with hydric soils are not anticipated as a result of the proposed Project.

### 7.2.3 Shallow Depth to Bedrock

The depth to bedrock indicates the depth from the ground surface at which bedrock is typically found for each soil type. Bedrock refers to the solid rock that underlies the soil and other unconsolidated material that is exposed at the ground surface. Bedrock within proximity to the ground surface constrains trenching and backfilling operations associated with pipeline construction. As indicated in Table 7.1-2, none of the soils traversed by the Project alignment have a depth to bedrock less than 60 inches. Therefore, specialized construction techniques associated with pipeline installation in areas of shallow bedrock are not anticipated.

### 7.2.4 Severe Erosion

Erosion is defined as the wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep. Erosion processes may also be accelerated by human activity, primary causes being tillage, grazing, and cutting of timber. Soil susceptibility to erosion is determined by many factors, such as soil texture and structure, topography and slope, surface roughness, vegetative cover, and climate. According to the USDA NRCS Geographic ("SSURGO") database, none of the soils crossed by the proposed Project are rated as having severe erosion potential (Table 7.1-1) (MassGIS 2007).

## 7.3 CROPLAND AND RESIDENTIAL IMPACTS

The Project facilities do not affect any agricultural or residential lands. Therefore, loss of soil fertility due to trenching and backfilling that could adversely affect these land uses will not occur. Additionally, no drainage tiles or irrigation systems will be impacted by the movement of construction equipment or trenching activities.

## 7.4 MITIGATION

This section contains information pertaining to specialized construction methods along pipeline rights-of-way. Temporary soil impacts will be limited to the pipeline right-of-way during the period of construction and mitigated through the implementation of the FERC Plan and Procedures (Appendix C) as well as Algonquin's E&SCP (Appendix D). These plans emphasize the use of standard erosion control techniques to reduce the potential for erosion and the use of temporary control measures such as interceptor dikes, rip-rap, or sediment barriers, followed by re-establishment of stabilizing vegetation to minimize erosive impacts.

The following sections briefly address soil impact mitigation measures that Algonquin will use during construction.

### 7.4.1 Erosion Control

Construction associated with the J-2 Loop Project temporarily increases the potential for compaction, erosion, sedimentation and disruption of roadway drainage. The pipeline will be constructed in a manner that will minimize environmental impacts and conditions specific to the urban nature of the construction area. The Stove-Pipe construction technique will be implemented to minimize the amount of open trench and length of pipeline string. Excavated trench material will be transported offsite and spoil will be disposed of at an approved appropriate landfill or other appropriate disposal location. In addition, the trench will be backfilled daily with "hand excavatable" controlled density fill ("CDF"). All drainage ways and catch basins will be protected from soils disturbed during construction and will be restored upon completion of the Project alignment.

Algonquin will conduct the proposed installation activities in accordance with the Project's Erosion and Sedimentation Control Plan ("E&SCP"), which is provided in Appendix D of this Environmental Report. This plan describes in detail, restoration techniques and mitigation measures to be utilized for the Project. A Spill Prevention Controls and Countermeasures ("SPCC") Plan is included as an attachment to the E&SCP.

The Project's E&SCP incorporates the FERC's Upland Erosion Control, Revegetation, and Maintenance Plan ("Plan," 1/17/2003 version) and Wetland and Waterbody Construction and Mitigation Procedures ("Procedures," 1/17/2003 version), with two proposed exceptions. Section 1.2 of the E&SCP states it deviates from Sections V.C.1 and V.C.3 of the FERC's Plan by not requiring compaction testing or soil compaction mitigation in residential areas disturbed by construction. These exceptions are routinely sought by Algonquin and, in this project-specific case, are not relevant because work activities would be confined to existing facility sites, rights-of-way, and urban/industrial area, and will not cross residential lands.

### 7.4.2 Revegetation

The vast majority of work associated with the proposed J-2 Loop Project will be located within existing paved roadways. Therefore, revegetation of disturbed areas is not applicable.

## 7.5 LITERATURE CITED

United States Department of Agriculture, Soil Conservation Service, in cooperation with the Massachusetts Agricultural Experiment Station, *Soil Survey of Middlesex County, Massachusetts,* 1995.

MassGIS. 2007. Soils. Datalayers/GIS Database. Updated May 2007. [Online WWW]. Available URL: http://mass.gov/mgis/soi.htm. [Accessed July 2007].

# ALGONQUIN GAS TRANSMISSION, LLC

# J-2 LOOP PROJECT

## *Resource Report 8*

## *Land Use, Recreation and Aesthetics*

# RESOURCE REPORT 8 – LAND USE, RECREATION AND AESTHETICS FERC ENVIRONMENTAL CHECKLIST

| Part 380 – Minimum Filing Requirements for Environmental Reports | Company Compliance or Inapplicability of Requirement |
|---|---|
| Classify and quantify land use affected by (§ 380.12 (j)(1)).<br>• Pipeline construction and permanent rights of way (§ 380.12 (j)(1));<br>• Extra work / staging areas (§ 380.12 (j)(1));<br>• Access Roads (§ 380.12 (j)(1));<br>• Pipe and contractor yards (§ 380.12 (j)(1)); and<br>• Aboveground facilities (§ 380.12 (j)(1)). | Section 8.1.1 and Tables 8.1-1 and 8.1-2<br>Section 8.1.1 and Table 8.1-4<br>Section 8.1.1 and Table 8.1-5<br>Section 8.1.1 and Table 8.1-6<br>Section 8.1.1 and Table 1.2-2 |
| Identify by milepost all locations where the pipeline right-of-way would at least partially coincide with existing right-of-way, where it would be adjacent to existing rights-of-way, and where it would be outside of existing right-of-way. (§ 380.12 (j)(1)). | Section 8.1.1<br>Table 8.1-3 |
| Provide detailed typical construction right-of-way cross-section diagrams showing information such as widths and relative locations of existing rights-of-way, new permanent right-of-way, and temporary construction right-of-way. (§ 380.12 (j)(1)). | Appendix E |
| Summarize the total acreage of land affected by construction and operation of the Project (§ 380.12 (j)(1)). | Table 1.2-3<br>Table 8.1-2 |
| Identify by milepost all planned residential or commercial/business development and the time frame for construction (§ 380.12 (j)(3)). | Section 8.2.1 |
| Identify by milepost special land uses (e.g. sugar maple stands, specialty crops, natural areas, national and state forests, conservation land, etc.). (§ 380.12 (j)(4)). | Section 8.3.1 |
| Identify by beginning milepost and length of crossing all land administered by Federal, state or local agencies, or private conservation organizations. (§ 380.12 (j)(4)). | Section 8.3.1<br>Table 8.3-1 |
| Identify by milepost all natural, recreational or scenic areas and all registered natural landmarks crossed by the Project. (§ 380.12 (j)(4 and 6)). | Section 8.3.2 |
| Identify all facilities that would be within designated coastal zone management areas. (§ 380.12 (j)(4 and 7)). | Section 8.3.3 |

# RESOURCE REPORT 8 – LAND USE, RECREATION AND AESTHETICS FERC ENVIRONMENTAL CHECKLIST (continued)

| Part 380 – Minimum Filing Requirements for Environmental Reports | Company Compliance or Inapplicability of Requirement |
|---|---|
| Identify by milepost all buildings that would be within 50 feet of the construction right-of-way or extra work area. (§ 380.12 (j)(5)). | Section 8.2.2 |
| Identify all designated or proposed candidate National or State Wild and Scenic Rivers crossed by the Project. (§ 380.12 (j)(6)). | Section 8.3.2 |
| Describe any measures to visually screen aboveground facilities, such as compressor stations. (§ 380.12 (j)(11)). | Section 8.4 |
| Demonstrate that applications for rights-of-way or other proposed land use have been or soon will be filed with federal land-managing agencies with jurisdiction over land that would be affected by the Project. (§ 380.12 (j)(12)). | Not Applicable |

# TABLE OF CONTENTS

8.0 LAND USE, RECREATION AND AESTHETICS ..... 1
8.1 LAND USE ..... 1
8.1.1 Pipeline Facilities ..... 1
8.1.2 Aboveground Facilities ..... 2
8.1.3 Facility Abandonment / Replacement ..... 2
8.1.4 Impact and Mitigation ..... 3
8.2 RESIDENTIAL AREAS ..... 7
8.2.1 Planned Residential and Commercial Areas ..... 7
8.2.2 Existing Residences and Buildings ..... 7
8.3 PUBLIC LAND, RECREATION AND OTHER DESIGNATED AREAS ..... 8
8.3.1 Public or Conservation Land ..... 8
8.3.2 Natural, Recreational or Scenic Areas ..... 9
8.3.3 Coastal Zone Management Areas ..... 9
8.3.4 Agency and Landowner Consultation ..... 9
8.3.5 Impact and Mitigation ..... 9
8.4 VISUAL RESOURCES ..... 9
8.5 APPLICATIONS FOR RIGHT-OF-WAY AND OTHER LAND USE ..... 10
8.6 LITERATURE CITED ..... 10

## LIST OF TABLES

8.1-1 Land Crossed by Pipeline Segment of the J-2 Loop Project ........ 4
8.1-2 Acreage Affected by Construction and Operation of the Pipeline Segment of the J-2 Loop Project ........ 5
8.1-3 Areas of Proposed Additional Temporary Workspace to be Utilized during Construction of the Pipeline Segment of the J-2 Loop Project ........ 6
8.1-4 Pipe and Contractor Yards to be Used during Construction of the J-2 Loop Project ........ 7
8.2-1 Residences and Buildings within 50 feet of the proposed Construction Work Space ........ 8

## FIGURES

8.1-1 Algonquin J-2 Loop Project Pipeline Alignment Land Use

# 8.0 LAND USE, RECREATION AND AESTHETICS

Resource Report 8 characterizes the land use in areas affected by the Project, identifies potential construction and operation impacts on these uses, and addresses mitigation measures that will be utilized to minimize or avoid impacts. Section 8.1 describes the existing land uses crossed by the Project and quantifies impacts according to land use type. Section 8.2 provides information on existing and planned residential areas. Section 8.3 identifies special land use areas, including public lands, recreational lands and designated conservation areas, and summarizes consultations with federal, state and local agencies. Visual resources are described in Section 8.4. Section 8.5 reviews ROW applications and other land use, and a list of references used in preparation of this resource report is provided in Section 8.6.

## 8.1 LAND USE

Characterization of land use was completed using information gathered from field surveys conducted in November of 2007 and through interpretation of recent aerial photographs of the Project area. Land use types along the proposed pipeline route were divided into four classifications: roadways, wetlands, residential and commercial/industrial as defined in the FERC *Guidance Manual for Environmental Report Preparation* (2005). Table 8.1-1 identifies the total linear distance the Project will traverse through each land use category, and Table 8.1-2 details the construction and operation impacts associated with the Project on identified land uses.

### 8.1.1 Pipeline Facilities

#### 8.1.1.1 Construction and Permanent Rights-of-Way

Algonquin has sited the J-2 Loop Project entirely within existing roadways, paved parking areas, and previously disturbed areas. Therefore, impacts to existing land use, aesthetics and recreation resulting from the proposed Project will be minimal. The construction ROW will vary in width based upon the availability of temporary workspace. Based on the extent of the alignment sited within the roadways, new permanent ROW will be minimal and is associated with the portion of the Project adjacent to the existing meter station. Appendix E provides typical ROW configurations detailing the temporary workspace and permanent ROW associated with the Project. Table 8.1-2 summarizes land uses and acreages associated with the construction and operation of the Project.

#### 8.1.1.2 Existing Right of Way

Approximately 2.29 miles of the Project (MP 0.02 -1.90 and 1.98 – 2.29) will be located within roadways or road layouts. By siting the Project within and adjacent to existing roadways, Algonquin will minimize the need for new disturbance associated with the installation of the pipeline. Table 8.1-3 summarizes the types and width of the existing ROWs paralleled and crossed by the Project and indicates the width of overlap with each existing ROW during construction. The proposed facilities do not cross or lie adjacent to any areas of special land use such as specialty crops, grazing allotments or Conservation Resource Protection ("CRP") lands.

#### 8.1.1.3 Additional Temporary Work Areas

In addition to the typical construction ROW, ATWS areas will be required to facilitate construction through portions of the route. Due to the general lack of workspace along the alignment, there is no typical ATWS configuration. A list of ATWS areas required to construct the Project is presented within Table 8.1-4. ATWS areas are also depicted on the photo-based alignment sheets in Appendix H.

#### 8.1.1.4 Access Roads

The J-2 Loop Project has been sited entirely within existing roadways, paved parking areas, and disturbed areas adjacent to I-93 and therefore, will not require the construction and/or use of new access roadways. The Project area will be accessed from existing roadways, commercial driveways and parking lots. Algonquin has identified a total of three access roads, as depicted on the Project alignment sheets, for use during construction of the Project.

#### 8.1.1.5 Pipe and Contractor Yards / Staging Areas

Algonquin and its contractors will utilize a total of three pipeyards / staging areas totaling approximately 2.91 acres in size for pipe storage, parking and staging during construction. Use of the areas will be temporary in nature and will be restored to the pre-existing land use upon completion of the Project. The pipe storage and staging areas are depicted on the full size USGS topographic quadrangle map and excerpt included in Appendix F.

### 8.1.2 Aboveground Facilities

A new valve assembly is associated with the proposed Project and will be located at MP 2.29. The valve site will require a total of 0.54 square feet for construction of the facility. The Project also includes modification to the existing meter station at MP 0.0. The construction of the valve and modifications to the meter station will occupy approximately 0.40 acres but will not require an associated change in land use. Tables 1.1-2 and 1.2-2 detail the aboveground facilities and the land required for construction and operation of the facilities. Appendix I provides preliminary site-specific plans for aboveground facilities proposed by Algonquin.

### 8.1.3 Facility Abandonment / Replacement

The proposed J-2 Loop Project does not involve the abandonment or replacement of either aboveground or underground pipeline facilities.

### 8.1.4 Impact and Mitigation

The impacts to land uses throughout the Project area will be minimal since the majority of the alignment has been sited within existing roadways and previously disturbed areas. Due to the disturbed nature of the surrounding area, Algonquin does not anticipate any permanent impact to the existing land uses along the alignment. At the completion of pipeline construction, the affected roadways and ATWS areas will be restored to pre-construction conditions.

#### 8.1.4.1 Roadways

Algonquin's J-2 Loop Project has been sited primarily within existing roadways. Potential temporary impacts associated with the construction of the pipeline facilities include disruption of traffic flows, identification and construction around existing underground utilities such as water and sewer lines, and maintenance of emergency vehicle access. There will be no permanent effects on existing land use, specifically roadways, resulting from the proposed Project. Algonquin will acquire all of the necessary permits relative to construction in roadways prior to the commencement of construction activities. Additionally, Algonquin will arrange a police detail to minimize traffic congestion at the affected roadways throughout the construction of the Project. Traffic lanes and residential access will be maintained except for the temporary periods essential for laying pipeline.

#### 8.1.4.2 Wetlands

A total of two (2) wetland/drainage swales have been identified within or adjacent to the Project corridor. Wetland 1 is located adjacent to the proposed route at MP 0.21. The identified wetland/drainage swale is within 100-feet of the proposed Project corridor, but will not be directly affected by construction or operation of the Project. Wetland 2 is also adjacent to the Project corridor, and is located at MP 0.57, along the southbound shoulder of Mystic Avenue. No adverse impacts to this drainage feature are expected as the wetland is located outside of the construction corridor.

#### 8.1.4.3 Residential Land

While the MassGIS land use datalayer (2002) indicates that a significant portion of the area surrounding the proposed alignment is high density, multi-family residential, Algonquin does not anticipate significant adverse impacts on residential land as the majority of the pipeline and workspace are limited to existing roadways. Algonquin shall implement measures during construction to ensure safe access and egress to all properties located along the Project corridor as well as pedestrian safety along sidewalks.

#### 8.1.4.4 Commercial / Industrial Land

Approximately 7,515 linear feet of the Project alignment is located adjacent to commercial / industrial land. Potential Project-related impacts include temporary loss of parking area. Algonquin shall expedite construction to the extent practicable to minimize disruption to the businesses.

### TABLE 8.1-1
### LAND CROSSED BY PIPELINE SEGMENT OF THE J-2 LOOP PROJECT PIPELINE

| City | Roadways a/ | | Forest b/ | | Wetlands c/ | | Residential | | Com./Ind. | | Other d/ | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Miles | % | Miles | % | Miles | % | Miles | % | Miles | % | Miles | % | |
| Medford | 0.60 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.60 |
| Somerville | 1.69 | 69 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.69 |
| **Total** | **2.29** | **100** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **2.29** |

a/ Includes Federal, State and local roadways.
b/ Upland forest only.
c/ Includes forested wetlands, palustrine scrub-shrub wetlands, and palustrine emergent wetlands. Includes only those wetlands directly crossed by pipeline.
d/ Includes maintained utility easement (railroad, electric transmission, etc.) crossings.
Note: Total indicates the percentage of land crossed by each use type over the entire alignment.

### TABLE 8.1-2
### ACREAGE AFFECTED BY CONSTRUCTION AND OPERATION OF THE J-2 LOOP PROJECT

| City | Roadways a/ | | Forest b/ | | Wetlands d/ | | Residential | | Com./Ind. | | Other e/ | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Temp c/ | Perm | Temp | Perm | Temp | Perm | Temp | Perm | Temp | Perm | Temp | Perm | Temp | Perm |
| Medford | 8.35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.34 | 0.09 | 0 | 0 | 10.69 | 0.09 |
| Somerville | 18.26 | 0 | 0 | 0 | 0 | 0 | 1.39 | 0 | 6.45 | 0.28 | 0 | 0 | 26.10 | 0.28 |
| **Total** | **26.61** | **0** | **0** | **0** | **0** | **0** | **1.39** | **0** | **8.79** | **0.37** | **0** | **0** | **36.79** | **0.37** |

a/ Includes both State and local roadways.

b/ Upland forest only.

c/ Temporary includes both the permanent easement (typically 50 feet) as well as the temporary workspace (25 feet) and additional temporary workspace (variable width and length)

d/ Total workspace within wetlands is 75 feet (50 feet of temporary workspace and 25 feet of permanent easement). Temporary acreage affected includes both the permanent easement and the temporary workspace.

e/ Includes maintained utility easement (railroad, electric transmission, etc.) crossings.

## TABLE 8.1-3
## AREAS OF PROPOSED ADDITIONAL TEMPORARY WORKSPACE TO BE UTILIZED DURING CONSTRUCTION OF THE PIPELINE SEGMENT OF THE J-2 LOOP PROJECT

| City | Milepost | Width (Feet) | Length (Feet) | Total Area (Acreage) | Location |
|---|---|---|---|---|---|
| Medford | 0.0-0.004 | Variable | 25 | 0.17 | Parking lot at Meter Station |
| Medford | 0.004-0.12 | Variable | 636 | 0.07 | Parking Area Int. Mystic Valley/Mystic Ave |
| Medford | 0.14-0.34 | 20 | 1,050 | 0.48 | Paved Areas along Roadway |
| Somerville | 1.02-1.05 | 100 | 173 | 3.42 | Abutters Grass Area |
| Somerville | 1.05-1.06 | 370 | 40 | 0.34 | Butler Dr. (Private Rd) |
| Somerville | 1.06-1.11 | 100 | 265 | 0.05 | Abutters Grass Area |
| Somerville | 1.19-1.21 | 200 | 140 | 0.52 | Abutters Grass & Paved Area |
| Somerville | 1.37-1.39 | 88 | 71 | 0.14 | Abutters Grass Lot |
| Somerville | 1.83-1.89 | 190 | 332 | 1.26 | Commercial Lot |
| Somerville | 2.25-2.29 | 90 | 121 | 0.24 | Abutters Paved Lot |
| **Total** | | | | 6.69 | - |

**TABLE 8.1-4**
**PIPE AND CONTRACTOR YARDS / STAGING AREAS TO BE USED DURING CONSTRUCTION OF THE J-2 LOOP PROJECT**

| City | Milepost | Description | Total Acres | Existing Land Use |
|---|---|---|---|---|
| Medford | 0.0-0.34 | Parking | 1.62 | Parking / Boat Storage / Private Road |
| Somerville | 1.39-1.50 | Paved | 1.01 | Parking |
| Somerville | 1.91-1.96 | Grass Slope | 0.28 | Open Space |
| **Total** | | | 2.91 | - |

## 8.2 RESIDENTIAL AREAS

### 8.2.1 Planned Residential and Commercial Areas

The Planning Boards of each city were contacted to determine whether any proposed residences, subdivisions or commercial developments have been approved within 0.25 miles of the construction workspace. Consultation with the City of Medford did not identify any planned developments within 0.25 miles of the Project (DiLorenzo 2007). No response from the City of Somerville has been received to date.

### 8.2.2 Existing Residences and Buildings

The proposed Project area is located within a thickly settled residential area of Medford and Somerville. Residences are characterized by high density, multi-family units. Table 8.2-1 lists the residences that are within 50-feet of the proposed alignment. Algonquin has identified residences within 25 feet of the construction workspace and is in the process of preparing site-specific work plans in accordance with FERC requirements. These work plans shall be submitted to FERC / OEP staff for review and approval prior to the commencement of construction activities.

**TABLE 8.2-1**
**RESIDENCES AND BUILDINGS WITHIN 50 FEET OF THE PROPOSED CONSTRUCTION WORK SPACE**

| Project Component | City | MP | Number of Structures & Type | Distance to Limit of Workspace (Number of Structures) | | Proposed Mitigation |
|---|---|---|---|---|---|---|
| | | | | 0'-25' | 25' to 50' | |
| Pipeline | Medford | 0.0-0.25 | 6 | 6 | 0 | a, b, c |
| | | 0.25-0.50 | 7 | 5 | 2 | a, b, c |
| | | 0.50-0.61 | 5 | 5 | 0 | a, b, c |
| **Subtotal** | | | **18** | **16** | **2** | - |
| Pipeline | Somerville | 0.61-0.75 | 6 | 6 | 0 | a, b, c |
| | | 0.75-1.0 | 9 | 2 | 7 | a, b, c |
| | | 1.0-1.25 | 16 | 14 | 2 | a, b, c |
| | | 1.25-1.50 | 25 | 25 | 0 | a, b, c |
| | | 1.50-1.75 | 45 | 45 | 0 | a, b, c |
| | | 1.75-2.0 | 20 | 19 | 1 | a, b, c |
| | | 2.0-2.25 | 24 | 23 | 1 | a, b, c |
| | | 2.25-2.29 | 17 | 16 | 1 | a, b, c |
| **Subtotal** | | | **162** | **150** | **12** | - |
| **TOTAL** | | | **180** | **166** | **14** | - |

**Keys on Mitigation:**

a Use stove-piping or drag-section construction techniques

b Fence the edge of the workspace, if necessary, in accordance with municipal agreements and permit conditions

c Restore pavement and sidewalk following pipe installation, backfill in accordance with agreements with affected municipalities.

## 8.3 PUBLIC LAND, RECREATION AND OTHER DESIGNATED AREAS

No public lands, recreation areas or other special land uses will be crossed by the pipeline or affected by the construction workspace.

### 8.3.1 Public or Conservation Land

The Project will not cross any National Forests, or land administered by federal agencies such as Indian reservations, designated wilderness areas, nature preserves or registered natural landmarks (Clark 2007).

### 8.3.2 Natural, Recreational or Scenic Areas

The United States National Park Service ("NPS") has indicated that no protected resources are located within one mile of the Project (Clark 2007). Algonquin consulted with the DCR regarding the proximity of the pipeline alignment to the Mystic Valley Reservation and will continue to work with DCR staff relative to licensing of the pipeline for occupation within a portion of Mystic Valley Parkway.

### 8.3.3 Coastal Zone Management Areas

The Massachusetts Coastal Zone Management Agency ("CZM") has indicated that the activities associated with the J-2 Loop Project fall outside the geographical boundaries of the Massachusetts Coastal Zone as outlined in *Chapter 5: Massachusetts Coastal Regions and An Atlas of Resources, 1 June 1977* (Boeri 2008).

### 8.3.4 Agency and Landowner Consultation

Algonquin is in the process of acquiring all necessary easements/approvals to install the pipeline facilities associated with the Project across affected private and land management agency properties. Additionally, Algonquin will acquire all necessary permits and clearances, as detailed in Table 1.6-1 of Resource Report 1, prior to commencement of construction. Table 1.6-2 provides a list of agencies contacted for information, consultation or technical assistance during preparation of this Environmental Report. Copies of all correspondences received to date are provided in Appendix B. Any further responses received from these agencies will be subsequently forwarded to FERC.

### 8.3.5 Impact and Mitigation

A detailed list of public land and designated recreation areas are provided within Table 8.3-1. This table also defines the extent of the linear crossing by the pipeline facilities as well as the acreage affected during construction of the Project. The proposed alignment will not result any new, permanent disturbance as this portion of the Reservation has been previously disturbed through historic land use.

## 8.4 VISUAL RESOURCES

The Project does not cross any areas designated by the NPS as a National Scenic Trail. No waterbodies under the authority of the USNPS Wild and Scenic Rivers Act or related state programs have been identified within the Project area (Clark 2007). Permanent visual impacts associated with installation of the pipeline are not associated with Algonquin's J-2 Loop Project as the alignment has been sited entirely within existing roadways, parking lots and previously disturbed areas and will not require the clearing of trees. The proposed valve site associated with the Project has been located within a previously disturbed area and Algonquin does not anticipate any temporary or permanent impacts to visual resources as a result of the construction and operation of this facility.

## 8.5 APPLICATIONS FOR RIGHT-OF-WAY AND OTHER LAND USE

The proposed Project does not affect any land under the jurisdiction of Federal land-managing agencies; therefore, no applications for right-of-way or other land use are required.

## 8.6 LITERATURE CITED

Boeri, Robert L. 2008. March 10, 2008 Letter from Robert L. Boeri, CZM, to John Zimmer, ENSR.

Clark, David. 2007 Telephone correspondence between David Clark, National Park Service and John Zimmer, ENSR on November 2, 2007.

DiLorenzo, Lauren. 2007. Undated Letter from Lauren DiLorenzo, City of Medford Office of Community Development to John Zimmer, ENSR.

MassGIS. 2002. Land Use Data Layer [online WWW]. Available URL: http://maps.massgis.state.ma.us/massgis_viewer/index.htm. [Accessed August 2007].

# ALGONQUIN GAS TRANSMISSION, LLC

# J-2 LOOP PROJECT

## *Resource Report 9*

## *Air and Noise Quality*

# RESOURCE REPORT 9 – AIR AND NOISE
# FERC ENVIRONMENTAL CHECKLIST

| Part 380 – Minimum Filing Requirements for Environmental Reports | Company Compliance or Inapplicability of Requirement |
|---|---|
| Describe existing air quality in the vicinity of the Project. (§ 380.12 (k)(1)). | Not applicable |
| Quantify the existing noise levels (day-night sound level (Ldn) and other applicable noise parameters) at noise-sensitive areas and at other areas covered by relevant state and local noise ordinances (§ 380.12 (k)(2)). | Not applicable |
| Quantify existing and proposed emissions of compressor equipment, plus construction emissions, including nitrogen oxides ($NO_x$) and carbon monoxide (CO), and the basis for these calculations. Summarize anticipated air quality impacts for the Project. (§ 380.12 (k)(3)). | Not applicable |
| Describe the existing compressor units at each station where new, additional, or modified compression units are proposed, including the manufacturer, model number, and horsepower of the compressor units. For proposed new, additional, or modified compressor units, include the horsepower, type and energy source. (§ 380.12 (k)(4)). | Not applicable |
| Identify any nearby noise-sensitive area by distance and direction from the proposed compressor unit building / enclosure. (§ 380.12 (k)(4)). | Not applicable |
| Identify any applicable state or local noise regulations. (§ 380.12 (k)(4)). | Not applicable |
| Calculate the noise impact at noise-sensitive areas of the proposed compressor unit modifications or additions, specifying how the impact was calculated, including manufacturer's data and proposed noise control equipment. (§ 380.12 (k)(4)). | Not applicable |

# 9.0 AIR AND NOISE

This resource report is required for applications involving compressor facilities at new or existing stations, or for all new liquefied natural gas (LNG) facilities. The Project does not involve a compressor station or LNG facilities. Therefore, in accordance with FERC guidance provided in 18 Code of Federal Regulations (CFR) Part 380.12(k), Resource Report 9 addressing information related to Air and Noise Resources is not required.

Spectra Energy

# ALGONQUIN GAS TRANSMISSION, LLC

## J-2 LOOP PROJECT

*Resource Report 10*

*Alternatives*

# RESOURCE REPORT 10 – ALTERNATIVES FERC ENVIRONMENTAL CHECKLIST

| Part 380 – Minimum Filing Requirements for Environmental Reports | Company Compliance or Inapplicability of Requirement |
|---|---|
| Address the “no action” alternative (§ 380.12 (l)(1)). | Section 10.1 |
| For large Projects, address the effect of energy conservation or energy alternatives to the Project (§ 380.12 (l)(1)). | Section 10.1.1<br>Section 10.1.2 |
| Identify system alternatives considered during the identification of the Project and provide the rationale for rejecting each alternative (§ 380.12 (l)(1)). | Section 10.2 |
| Identify major and minor route alternatives considered to avoid impact on sensitive environmental areas (e.g. wetlands, parks, or residences) and provide sufficient comparative data to justify the selection of the proposed route (§ 380.12 (l)(3)). | Section 10.3 |
| Identify alternative sites considered for the location of major new aboveground/ancillary facilities and provide sufficient comparative data to justify the selection of the proposed site (§ 380.12 (l)(3)). | Section 10.4 |

# TABLE OF CONTENTS

10.0 ALTERNATIVES.......3
10.1 NO ACTION ALTERNATIVE.......3
10.1.1 Energy Conservation.......3
10.1.2 Energy Alternatives.......3
10.2 SYSTEM ALTERNATIVES.......4
10.2.1 Existing Capacity.......4
10.3 ROUTE ALTERNATIVES.......4
10.3.1 Methodology and Rationale for Alternative Route Selection.......4
10.3.2 Major Route Alternatives.......5
10.4 Route Variations.......7
10.5 ALTERNATIVE ABOVEGROUND SITES.......8

# LIST OF TABLES

10.3-1 List of Pipeline Route Variations Associated with the J-2 Loop Project.......8

# LIST OF FIGURES

10.3-1a J-2 Loop Project Major Route Alternatives – Overview

10.3-1b J-2 Loop Project Major Route Alternatives – Alternative A

10.3-1b J-2 Loop Project Major Route Alternatives – Alternative B

10.3-1c J-2 Loop Project Major Route Alternatives – Alternative C

10.3-2 J-2 Loop Project Route Variations

# 10.0 ALTERNATIVES

This Project has undergone an extensive need and alternative routing analysis. The primary objective of the alternatives analysis was to provide natural gas service to the customer in a manner that avoids and minimizes potential adverse effects to the greatest extent practicable. Algonquin has evaluated routing options based on regional topography, potential for adverse environmental impacts, existing and future land usage, cost, and construction safety and feasibility considerations. Algonquin considered route alternatives in support of the FERC routing guidelines as set forth in 18 CFR Part 380.15. Described below are the alternatives that have been considered. Section 10.1 details the no-action alternative. Section 10.2 discusses system alternatives, and Section 10.3 evaluates route alternatives. Section 10.4 provides additional information relative to siting considerations.

## 10.1 NO ACTION ALTERNATIVE

The "no action" alternative in relation to this Project would avoid the temporary environmental impacts associated with pipeline installation. However, this alternative would result in the elimination of potential natural gas supply to the NSTAR system, the effects of which would include the inability of NSTAR to expand or otherwise maintain reliable service on its natural gas distribution system within the greater Boston metropolitan area, a significant delay in response to additional natural gas demand by residents and businesses in the Project area, and the potential for only temporary supply via liquefied natural gas ("LNG") to feed the NSTAR system.

### 10.1.1 Energy Conservation

Reduction in the need for additional energy usage is the preferred alternative wherever possible. The use of energy conservation alone will not allow NSTAR to maintain its existing operations in the greater Boston metropolitan area and does not provide for any ability for future expansion of its distribution system. The demand for natural gas within the Project area is growing, and NSTAR is expanding its distribution system to meet that future demand. This alternative was determined to be not feasible, as it does not meet the Project purpose and need and would adversely affect the ability of NSTAR to ensure that its existing natural gas distribution system meets current and projected load growth in the greater Boston metropolitan area.

### 10.1.2 Energy Alternatives

Alternative energy sources for Algonquin customers include oil, coal, biomass and nuclear fuels. All of these fuels are being used throughout areas within the proximity of the existing pipeline network. Current regulations in Massachusetts do not allow for the use of fossil fuels by a major source that would result in anything other than the lowest achievable emission rates in a severe non-attainment area (MGL c. 111 § 142A–142M; 310 CMR 6.00-8.00). The regulations were instituted to improve both air quality and the quality of life. Use of these alternative energy sources would directly conflict with state regulations and long-term energy and environmental policies and plans. Additionally, the NSTAR distribution system is not designed with the applicable infrastructure to operate its current systems under a fuel other than natural gas. Therefore, supplying adequate volumes of natural gas through the construction of the proposed J-2 Loop Project is the preferred alternative.

## 10.2 SYSTEM ALTERNATIVES

### 10.2.1 Existing Capacity

No major system alternatives were available for consideration, as there are no other pipelines that are owned and operated by Algonquin in the area that could provide the required volumes of natural gas without significant system improvements and greater environmental impacts. Algonquin does not have the current capacity within its existing system to meet the natural gas service requested by NSTAR. To meet this new demand, additional capacity must be created through the expansion of Algonquin's existing system and related facilities. The addition of these proposed facilities will allow Algonquin to meet the needs of its existing customers and supply NSTAR. The proposed alignment optimizes Project economics and minimizes potential adverse environmental effects to the greatest extent practicable.

## 10.3 ROUTE ALTERNATIVES

Several route alternatives to the proposed alignment were evaluated as part of the planning and design process for this Project. The alternatives were evaluated based on such factors as environmental, residential, and traffic impacts as well as permanent easement acquisitions and cost. Impacts to residential areas were evaluated in terms of traffic congestion during construction, maintenance requirements during operation, and the effects on residential neighborhoods and individual residences.

### 10.3.1 Methodology and Rationale for Alternative Route Selection

The objective of route selection was the identification of a Project alignment that minimizes potential environmental and community-related impacts while achieving the Project purpose. To achieve this, Algonquin utilized the following route selection criteria:

- Identification of technical requirements
- Development of routing criteria
- Identification of potential routing alternatives
- Collection of data relative to each alternative
- Evaluation of potential environmental impacts
- Evaluation of community-related impacts
- Evaluation of routing alternatives against routing criteria

Sources of existing information such as field reconnaissance, aerial photography, stakeholder meetings, U.S.G.S. topographic maps and National Wetland Inventory maps were also employed during Project routing. The intent of this process was to identify that the alignment, initiating from the tie-in located adjacent to the Mystic Valley Parkway to the existing J-2 System adjacent to the McGrath Highway, was technically feasible from a construction perspective, minimized environmental and community-related impacts, and was cost-effective.

The use of existing roadways was given primary consideration during the alternatives analysis process. Given the urban nature of the Project area, siting the pipeline alignment within existing roadway rights-of-way allows for the further minimization of impacts. Siting pipeline facilities along existing corridors reduces the establishment of new corridors in previously undisturbed areas. In addition, the landowner impact from the operation and maintenance of the facilities once in service is reduced by avoiding work on private properties.

### 10.3.2 Major Route Alternatives

The proposed alignment is located almost entirely within existing roadway ROWs. The operation and maintenance of the Project will not result in new permanent land impacts. The proposed route represents a minimization of environmental and residential impacts both during construction and operation. Additionally, because the Project involves the looping of an existing pipeline system, the proposed alignment needs to begin at the tap valve site for the existing J-2 pipeline and end at the existing NSTAR pipeline near the existing tie-in.

Algonquin initially considered Alternative A as the proposed alignment within the City of Somerville. However, preliminary consultations with both Somerville municipal officials, including representatives from the Department of Public Works and the City Engineer, and the local legislative delegation engendered significant concerns related to: (1) the potential traffic impacts at the intersection of Mystic Avenue and McGrath Highway, and (2) what were considered to be unacceptable impacts to the residential neighborhoods along Virginia, Jasper and Gilman Streets. The narrowness of residential streets such as Virginia Street led to significant concerns related to potential direct impacts on the residential properties in that neighborhood. In addition, access for public safety personnel through that area would be significantly restricted during construction. The crossing of the existing railroad in that immediate area also has significant engineering/construction issues related to it.

Based on that feedback, Algonquin undertook an extensive re-evaluation of possible alternative routes that would address the City of Somerville's concerns. Nearly a dozen possible routes were considered during that process. Meetings were then scheduled with representatives of the City of Somerville, the Massachusetts Highway Department ("Mass Highway"), the Massachusetts Department of Conservation and Recreation, the Executive Office of Transportation and Construction and the Massachusetts Bay Transit Authority (the "MBTA") in order to solicit their input concerning the various alternatives that were under review. The information received during those discussions covered such issues as local traffic patterns, anticipated bridge repair/modification work along several of the routes, the planned expansion of the Green Line subway system into Somerville, the residential density of certain areas, potential business disruptions, a designated 21E site along Tufts Street, and the overall constructability of each alternative.

Based on the aforementioned review and the input received, the Project narrowed its list of feasible alternatives. At that juncture, the Project scheduled additional meetings with representatives from the City of Somerville to present its analysis and to seek additional input from the municipality. Based on that feedback, Algonquin made additional refinements to its route and presented its proposal to a number of Somerville municipal officials, including representatives from the Mayor's office, the Department of Public Works and the City Engineer's office. Compared to the alternative routes presented below, their collective judgment was that the Project's proposed route will have the least overall impact on the City of Somerville and its residents and businesses. The area legislative delegation was also consulted during this process.

The Project followed a similar process of soliciting input with regard to the portion of its proposed route that is located within the City of Medford. Discussions with municipal officials, including the Mayor's office, area legislators, local citizens, area businesses and agencies such as Mass Highway provided invaluable information that Algonquin factored into its review. Of particular note is a potential private development along Mystic Avenue in Medford, between Fulbright Street and Mystic Valley Parkway, which has received strong interest from the City of Medford. Accordingly, the proposed route in that area has been located to minimize the impact to that potential development as well as Interstate Route 93 ("Rt. 93"), area businesses and local residences. Please refer to Figures 10.3-1a through 10.3-1d for graphical representations of the various alternative routes.

#### 10.3.2.1 Alternative A

This alternative extends from the meter station to the southwest along the edge of a parking lot for an existing commercial property (Staples) to an intersection point with Mystic Avenue. At that point Alternative A continues along Mystic Avenue to the intersection of McGrath Highway. The route then continues along or adjacent to McGrath Highway to Virginia and Gilman Streets, down Walnut Street and across the bridge on that street, and then proceeds along Medford Street to the tie-in point. Based on the Project's field review and the discussions described above, this alternative route was rejected based on the following factors: (a) significant impacts to the residential neighborhoods in the vicinity of Virginia, Jasper and Gilman Streets: (b) potential and significant impacts during construction on traffic at the intersection of Mystic Avenue and McGrath Highway and then along McGrath Highway. These streets constitute a major arterial roadway into Boston; (c) the potential impact to the Walnut Street Bridge from the proposed expansion of the Green Line Project by the MBTA which could require that the pipeline be taken out-of-service and relocated within only a few years after the pipeline was placed in-service; and (d) difficulties from a construction standpoint of crossing the existing railroad tracks in that area due to the significant differences in elevation on each side.

#### 10.3.2.2 Alternative B

This alternative is identical to the proposed route from the tap site up to Temple Street in Somerville. Alternative B then continues along Mystic Avenue to Fellsway West where it proceeds along that street in order to eliminate the potential for significant traffic disruption at the intersection of Mystic Avenue and McGrath Highway that is associated with Alternative A. Alternative B follows Fellsway West to Broadway where it proceeds east to McGrath Highway. This alternative route then proceeds along, adjacent to or across McGrath Highway to the railroad track overpass bridge and the tie-in point. Alternative B was rejected based on the following considerations: (a) this route requires crossing or otherwise circumventing the Gilman Street Bridge. That bridge has been deemed structurally deficient by the Massachusetts Highway Department and is scheduled to be demolished and replaced within the next several years once funds are appropriated. For that reason, the ability to construct along the entire length of McGrath Highway is not feasible because the pipeline would have to be taken out-of-service and relocated within a matter of only a few years at most; (b) since the Gilman Street Bridge and its forthcoming replacement presented a unique challenge, Alternative B requires that the potential alignment leave McGrath Highway in order to circumvent that structure. That then requires two road bores, one in the vicinity of the intersection of the McGrath Highway and Pearl and Delaware Streets and a second road bore across McGrath Highway on the south side of the Conrail overpass structure. The location of each bore will negatively impact local street access as well as residences and businesses in the immediate vicinity. In addition, there would be significant impacts during construction to the residences that immediately abut McGrath Highway in the area of Oliver Street and Auburn Avenue; (c) construction along Fellsway West could negatively impact or otherwise restrict access to Foss Park; and (d) construction within McGrath Highway, from Broadway to Pearl Street, and as the McGrath Highway crosses the Conrail overpass would negatively impact traffic along that major artery.

#### 10.3.2.3 Alternative C

Alternative C mirrors the Project's proposed route except in two instances: (a) the alignment would follow Mystic Avenue to Butler Drive, then proceed up Butler Drive until it intersects with Temple Street; and (b) at the end of Temple Street, the alignment would turn east on Broadway and then proceed up Marshall Street to the intersection with Medford Street. The Butler Drive portion was rejected after discussions with the private landowner and a review of their proposed development which will span over Butler Drive. Similarly, a review of the existing utility infrastructure within Marshall Street, the relative narrowness of that residential street compared to School Street, and factoring in additional input received from City officials, led to the conclusion that Marshall Street is an inferior option compared to School Street for that portion of the alignment.

### 10.3.2 Route Variations

At the outset of discussion with public officials in Medford, the Project was requested to explore route variations that would limit the length of the proposed route within Mystic Avenue due to concerns related to potential impacts on traffic. Algonquin subsequently explored several possible route variations between the tap site located adjacent to Mystic Valley Parkway and the Medford/Somerville municipal boundary. Several possible variations were reviewed: (a) an alignment that was totally within the highway layout for Rt. 93; (b) an alignment that was located within private property up to Fulbright Street, but located parallel to and near the edge of Rt. 93's highway layout; and (c) an alignment that would be partially parallel to Rt. 93's layout before crossing through a property currently owned by Mass Highway to Mystic Avenue.

However, discussions with Mass Highway and the current owners of the properties located along Mystic Avenue generated concerns or issues that mitigated against these variations. For example, Mass Highway cited to a 1992 policy that restricts the placement of utility infrastructure parallel to the interstate highway system in the highway layout absent extenuating circumstances. In addition, a private development project envisioned along Mystic Avenue generated significant comment from both the developer and City officials concerning the desire to limit the potential impact on that project from the final alignment chosen for the Project. Based on these considerations, the route variations in this area were deemed to be less favorable than the proposed route as filed.

**TABLE 10.3-1**
**LIST OF PIPELINE ROUTE VARIATIONS ASSOCIATED WITH THE J-2 LOOP PROJECT**

| Variation Designation | Approximate Milepost[1] | Description of Variation (Direction, location…etc.) | Reason |
|---|---|---|---|
| A | 0.00 to 0.70 | Route 93 layout<br>Parallel to preferred route to the east | - To avoid roadway impacts to Mystic Avenue.<br>- Rejected based upon discussion with Mass Highway. |
| B | 0.00 to 0.47 | Through private property between preferred route and Route 93 layout | - To avoid roadway impacts to Mystic Avenue.<br>- Rejected based on discussion with landowner and potential future site development constraints. |
| C | 0.00 to 0.25 | From meter station to the south approximately 200 feet prior to turning west down to Mystic Avenue | - To minimize length of pipe required from meter station to Mystic Avenue.<br>- Feasible, although additional discussion with Mass Highway required. |

1 – All three variations would start at the meter station. End milepost is the point along the preferred route where the variation would tie in.

## 10.5 ALTERNATIVE ABOVEGROUND SITES

The potential alternative aboveground/ancillary facility locations are limited for the Project based on the existing infrastructure and tie-in point with NSTAR. There are no feasible alternative tie-in locations along the NSTAR system that would allow for a further minimization of impacts beyond the use of the proposed location.

Spectra Energy

# ALGONQUIN GAS TRANSMISSION, LLC

# J-2 LOOP PROJECT

## *Resource Report 11*

## *Reliability and Safety*

# RESOURCE REPORT 11 – RELIABILITY AND SAFETY
# FERC ENVIRONMENTAL CHECKLIST

| Part 380 – Minimum Filing Requirements for Environmental Reports | Company Compliance or Inapplicability of Requirement |
|---|---|
| Describe how the Project facilities would be designed, constructed, operated and maintained to minimize potential hazard to the public from the failure of Project components as a result of accidents or natural catastrophes. (§ 380.12 (m)). | Not applicable |

# RESOURCE REPORT 11 – RELIABILITY AND SAFETY

## TABLE OF CONTENTS

11.0 RELIABILITY AND SAFETY ........ 1
11.1 INTRODUCTION ........ 1
11.2 NATURAL GAS TRANSMISSION PIPELINE SAFETY ........ 1
11.3 PIPELINE CONSTRUCTION AND DESIGN ........ 1
11.4 CONTINGENCY PLANS ........ 3
11.5 REFERENCES ........ 3

# 11.0 RELIABILITY AND SAFETY

## 11.1 INTRODUCTION

The Project facilities proposed in this application will be installed and operated consistent with sound engineering practices and all applicable safety standards, including the Federal Department of Transportation ("USDOT") Minimum Federal Safety Standards specified in 49 CFR Part 192. The proposed facilities will not materially affect the safety of existing facilities, but will enhance reliability, operation and maintenance of Algonquin's pipeline system.

## 11.2 NATURAL GAS TRANSMISSION PIPELINE SAFETY

Most natural gas consumed in the United States is delivered to consumers via underground transmission pipelines. Over the past 50 years, more than 300,000 miles of transmission pipelines have provided natural gas to more than 50 million consumers. Because of the critical role transmission pipelines play in supplying the energy needs of a large segment of the country, it is imperative that they be operated in a safe and reliable manner. Overall, the natural gas transmission industry has an excellent record of safety and reliability. Algonquin, in particular, has an excellent record of public safety since operations began in 1953. No pipeline or equipment failures that resulted in significant property damage or serious personal injury have occurred since operations began. Algonquin will continue to employ similar system design, construction, operation, and maintenance practices to ensure this excellent record is maintained.

The transportation of natural gas by pipeline involves some risk to the public in the event of an accident and subsequent release of gas. The greatest hazard is damage caused by a major pipeline rupture. Methane, the primary component of natural gas, is colorless, odorless, tasteless and lighter than air. It is not toxic, but is classified as a simple asphyxiate, posing a slight inhalation hazard. If methane is breathed in high concentration, oxygen deficiency can occur, resulting in serious injury or death. Methane has an ignition temperature of about 1,000 degrees Fahrenheit and is flammable at concentrations between 5.0 and 15.0 percent in air. Unconfined mixtures of methane in air are not generally explosive. Methane is buoyant at atmospheric temperatures and disperses rapidly in air.

The U.S. Department of Transportation ("USDOT") has been collecting and maintaining statistics on natural gas pipeline incidents and accidents since 1970. The highest percentage of transmission pipeline accidents or incidents is the result of damage caused by external forces (http://ops.dot.gov/stats/stats.htm). These external forces include third-party damage from construction equipment, earth movements (e.g., landslides), weather damage, or purposeful damage.

Portions of Algonquin's existing pipelines are located in areas that have experienced significant growth and development since the systems were originally installed. This growth and development has resulted in increased activity adjacent to the pipeline facilities and an increased potential for pipeline damage associated with excavations. However, Algonquin's safety and reliability record remains in good standing. The portion of the pipeline to be looped by the Project has been in service since 1953 and no incidents of external damage have occurred.

## 11.3 PIPELINE CONSTRUCTION AND DESIGN

The proposed facilities will be designed and constructed to meet or exceed the safety standards established by the USDOT in 49 CFR Part 192. The Project will be built in accordance with regulations that govern material selection and qualification, minimum design requirements, location adjacent to roads and railroads, and protection from internal, external, and atmospheric corrosion. Class locations specified in 49 CFR Part 192 will be used to determine minimum pipe wall thickness, shutoff valve spacing, and depth of cover required. High-strength carbon steel pipe per American Petroleum Institute ("API") Specification API 5L will be used for the pipe. Construction will be performed by qualified pipeline contractors in accordance with Algonquin's specifications. Contractor activities will be inspected by inspectors hired by Algonquin to ensure compliance with company specifications. Radiography of each pipeline weld will meet or exceed the minimum requirements of 49 CFR Part 192, with weld acceptance in accordance with the latest DOT referenced edition of API 1104.

Before placing the pipeline in service, hydrostatic testing of the piping will be conducted to verify the integrity of the pipe and welds. Any pipe segment that does not pass the hydrostatic test will be repaired and retested. The piping will be designed to allow for the use of electronic in-line inspection tools to determine wall thickness and the presence of detectable corrosion or defects. External corrosion protection will be achieved by means of externally coated pipe and cathodic protection using rectifiers and anodes as required by 49 CFR 192. An existing cathodic protection system will be used to mitigate corrosion of the pipeline facilities. The cathodic protection systems will impress a low voltage current to the pipeline to off-set natural soil and groundwater corrosion potential.

Part 192 also defines area classifications, based on population density in the vicinity of the pipeline. The class location unit is an area that exceeds 220 yards on either side of the centerline of any continuous one mile length of pipeline. The four area classifications are defined as follows:

| | |
|---|---|
| Class 1 | 10 or fewer buildings intended for human occupancy; |
| Class 2 | More than 10 but less than 46 buildings intended for human occupancy; |
| Class 3 | 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building or small well-defined outside area occupied by 20 or more people during normal use; and |
| Class 4 | buildings with four or more stories aboveground are prevalent. |

Class locations representing more populated areas require higher safety factors in pipeline design, testing and operation. In accordance with USDOT requirements, pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil (18 inches in consolidated rock). Pipelines in Class 2, 3 and 4 locations, as well as under drainage ditches of public roads and railroad crossings, must be installed with a minimum cover of 36 inches in normal soil (24 inches in consolidated rock). Class locations also specify the maximum distance to a sectionalizing block valve (i.e., 10.0 miles in Class 1, 7.5 miles in Class 2, 4.0 miles in Class 3 and 2.5 miles in Class 4). Pipe wall thickness and pipeline design pressures, hydrostatic test pressures, maximum allowable operating pressure, inspection and testing of welds, and frequency of pipeline patrols and leak surveys must also conform to higher standards in more populated areas.

The surface over the pipe is restored to its pre-existing condition, and Algonquin then installs markers to indicate the location of the buried pipeline. These markers, required by USDOT regulations, are placed in line-of-sight intervals as the buried pipeline crosses private and public property and are also installed at each and every road and railroad crossing. Markers are designed to enhance public safety and alert anyone planning any excavation of the location of the pipeline in a particular area. The markers contain a decal which indicates Algonquin’s name and the telephone number for assistance.

An important key to public safety is leak protection and detection. Algonquin operating personnel regularly perform visual inspections of the pipeline to identify potential problems. These inspections are done on foot, by vehicle on the ROW and aerial survey. Aerial inspections of the entire pipeline are done periodically. The rights-of-way are routinely viewed by vehicles at road crossings.

Algonquin is an active member and advocate of the Dig Safe program in Massachusetts and similar systems in other states. Through these programs, Algonquin is informed of planned third-party excavations, which allows Algonquin to monitor activities around the ROW to protect the pipeline.

Once the pipeline is in service, the Algonquin Gas Control Center electronically monitors the operations of the Algonquin pipeline system. The Gas Control Center is staffed 24 hours a day, 365 days a year and uses a state of the art computerized gas monitoring system to read pressures along the pipeline on a continuous basis every 60 seconds or less.

## 11.4 CONTINGENCY PLANS

Algonquin will be updating its existing Emergency Response Plan to incorporate the changes to the system as a result of the J-2 Loop Project. In the event of an emergency, Algonquin's operating personnel will implement the appropriate emergency plan. Algonquin's emergency plan will include the following information:

- the local field headquarters to contact;
- a listing of company personnel, local police, and fire authorities to contact;
- a listing of equipment available at field locations;
- a description of the roles of Field Supervisors, Gas Control Operators, Field Crews, and support personnel during an emergency;
- a description of the procedures to maintain communications between Gas Control Operations and local fire, police, and government authorities;
- a description of the procedures for securing additional help from non-company resources if needed; and
- requirements for logging emergency events and responding to company and regulatory authorities.

Algonquin will expand its existing liaison program with public authorities and local utilities to include al of the locations affected by the proposed facilities.

## 11.5 REFERENCES

U.S. Department of Transportation, Office of Pipeline Safety. Internet site: http//ops.dot.gov.

U.S. Department of Transportation, 49 CFR Part 192, Transportation of Natural and Other Gases by Pipeline, Minimum Federal Safety Standards.

Spectra Energy

# ALGONQUIN GAS TRANSMISSION, LLC

## J-2 LOOP PROJECT

## *Resource Report 12*

## *PCB Contamination*

# RESOURCE REPORT 12 – PCB CONTAMINATION
# FERC ENVIRONMENTAL CHECKLIST

| **Part 380 – Minimum Filing Requirements for Environmental Reports** | **Company Compliance or Inapplicability of Requirement** |
|---|---|
| For Projects involving the replacement or abandonment of facilities determined to have PCBs, provide a statement that activities would comply with an approved EPA disposal permit or with the requirements of the TSCA. (§ 380.12 (n)(1)). | Not applicable |
| For compressor station modification on sites that have been determined to have soils contaminated with PCBs, describe the status of remediation efforts completed to date. (§ 380.12 (n)(2)). | Not applicable |

# 12.0 PCB CONTAMINATION

Resource Report 12 is required for applications involving the replacement, abandonment by removal or abandonment in-place of pipeline facilities determined to have polychlorinated biphenyls ("PCBs") in excess of 50 parts per million ("ppm") in pipeline liquids (18 CFR 380.12(n)). Based upon the final PCB Mega-Rule (63 FR 35384), which went into effect on August 28, 1998, the EPA authorized use of PCBs in natural gas pipeline systems at concentrations of less than 50 ppm. Use of PCBs greater than 50 ppm is also authorized provided that pipeline companies continue annual sampling until results indicate that the levels have been reduced below 50 ppm for at least two consecutive samples at a minimum interval of 180 days.

The proposed Project does not involve the replacement, abandonment by removal or abandonment in-place of existing pipeline facilities determined to have PCBs in excess of 50 ppm. Based on this data and in accordance with FERC guidance provided in 18 CFR 380.12(n), Resource Report 12 is not required for the Project.

Spectra Energy

# ALGONQUIN GAS TRANSMISSION, LLC

# J-2 LOOP PROJECT

## *Resource Report 13*

## *Additional Information Related to LNG Plants*

# RESOURCE REPORT 13
# ADDITIONAL INFORMATION RELATED TO LNG PLANTS
# FERC ENVIRONMENTAL CHECKLIST

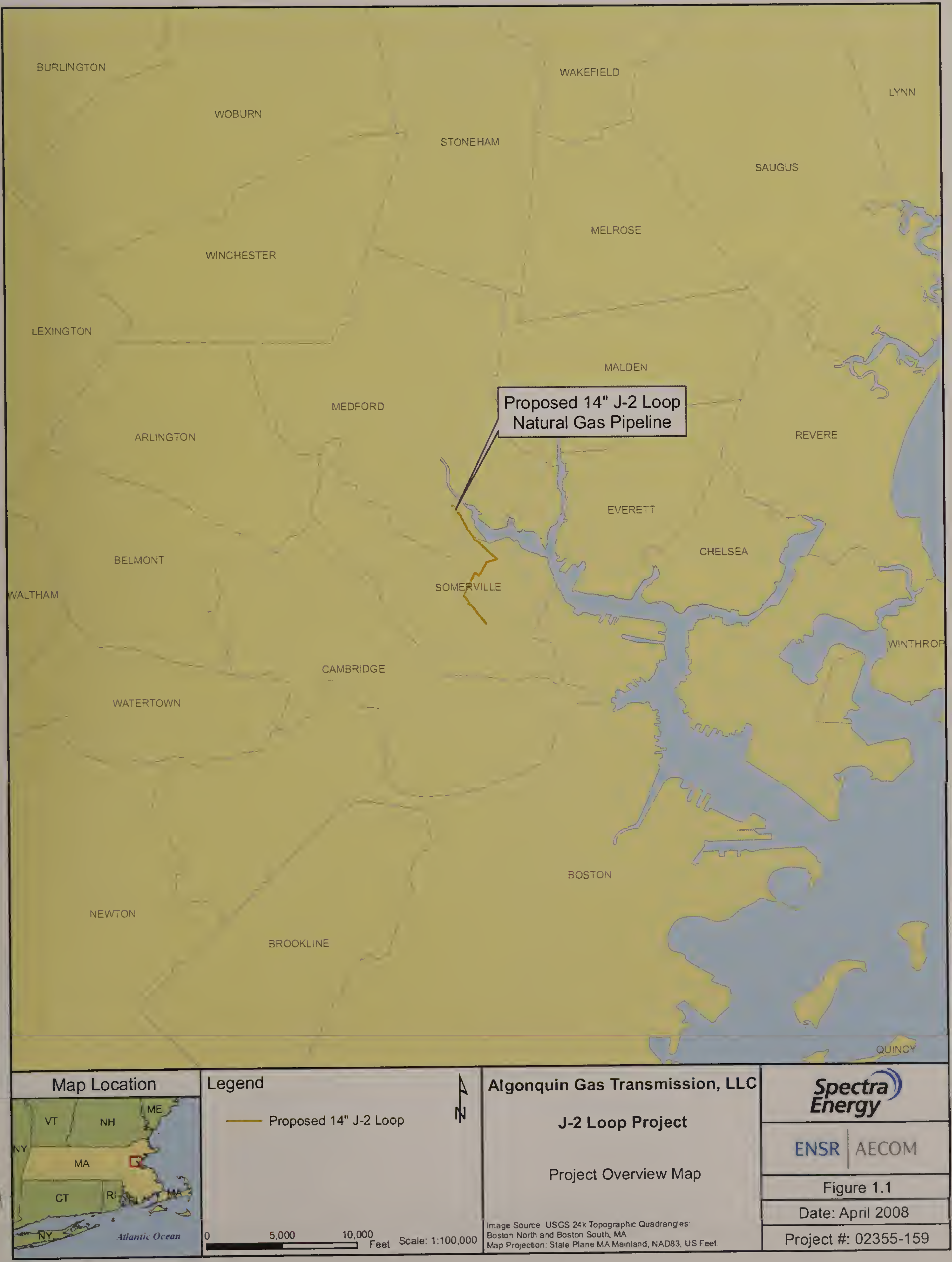
| Part 380 – Minimum Filing Requirements for Environmental Reports | Company Compliance or Inapplicability of Requirement |
|---|---|
| Provide all the listed detailed engineering materials. (§ 380.12 (o)). | Not applicable |

# 11.0 ADDITIONAL INFORMATION RELATED TO LNG PLANTS

This resource report is required for construction of new LNG facilities or the re-commissioning of existing LNG facilities. The Project does not involve the construction or re-commissioning of any LNG facility. Therefore, in accordance with FERC guidance provided in 18 CFR Part 380.12(o), Resource Report 13 addressing additional information related to LNG facilities is not required.

Spectra Energy

# *Appendix A – Figures*



Proposed 14" J-2 Loop Natural Gas Pipeline

Legend

Proposed 14" J-2 Loop

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Project Overview Map

Image Source: USGS 24k Topographic Quadrangles:
Boston North and Boston South, MA
Map Projection: State Plane MA Mainland, NAD83, US Feet

Spectra Energy

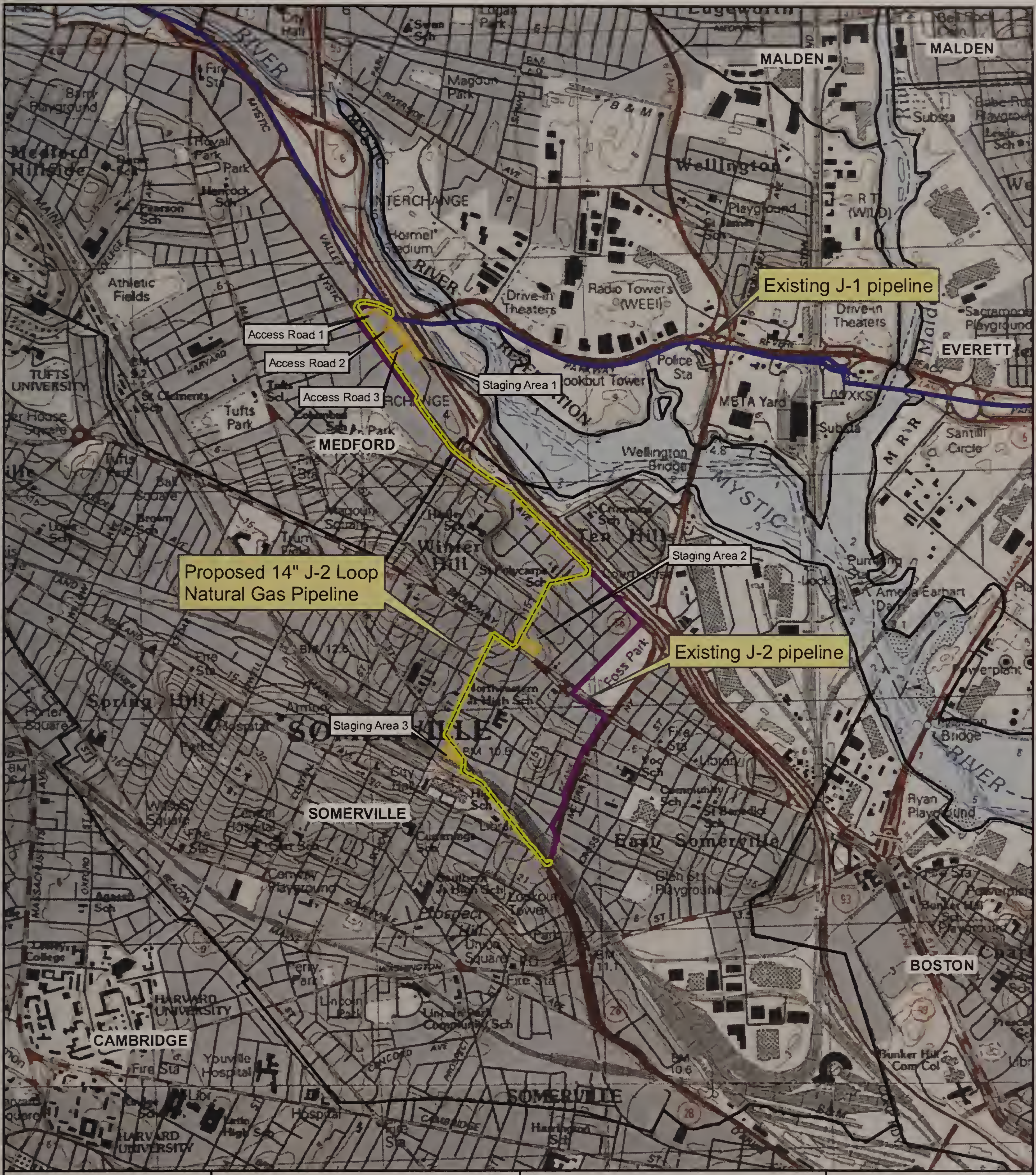
ENSR | AECOM

Figure 1.1

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR1\Figure_1-1_J-2_Project_Overview_Map.mxd



Map Location

Legend

- ▬ Proposed 14" J-2 loop
- ▬ Existing J-1 Pipeline
- ▬ Existing J-2 Pipeline
- ☐ Municipal Boundary
- ■ Staging Areas
- ─ Access Roads

N

0 500 1,000 2,000 Feet

Scale: 1:24,000
(1 inch = 2,000 ft)

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Overview Map

Image Source. USGS 24k Topographic Quadrangles:
Boston North and Boston South, MA.
Map Projection. State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

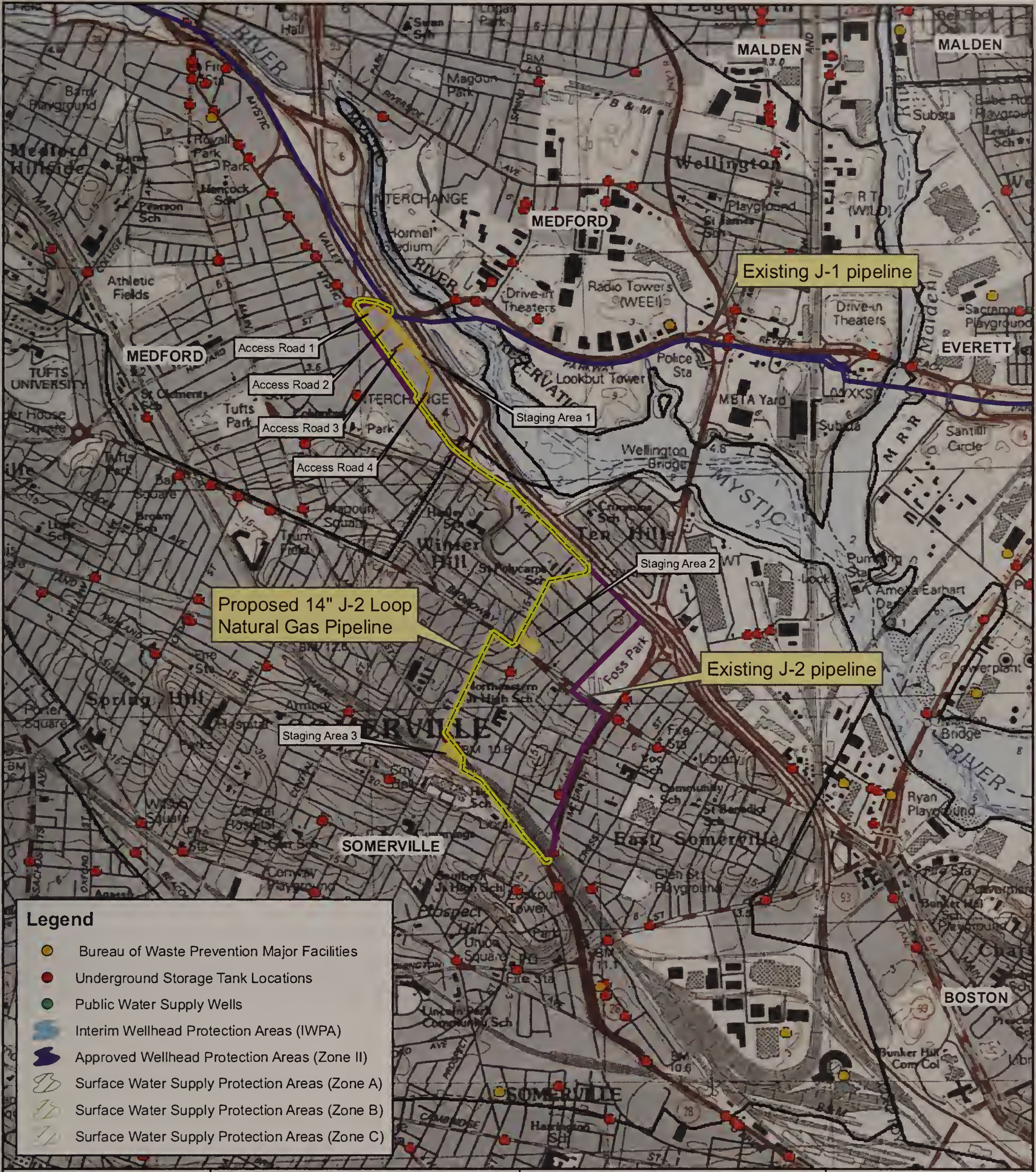
ENSR | AECOM

Figure 1.1-1

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR1\Figure_1-1-1_J-2_Loop_Overview_topo.mxd


MALDEN
MALDEN
MEDFORD
MEDFORD
EVERETT
SOMERVILLE
BOSTON
Existing J-1 pipeline
Access Road 1
Access Road 2
Access Road 3
Access Road 4
Staging Area 1
Staging Area 2
Staging Area 3
Proposed 14" J-2 Loop Natural Gas Pipeline
Existing J-2 pipeline
MYSTIC RIVER
Wellington
Radio Towers (WEEI)
Foss Park
Winter Hill
Spring Hill
East Somerville
Ten Hills
Tufts University
Legend
● Bureau of Waste Prevention Major Facilities
● Underground Storage Tank Locations
● Public Water Supply Wells
Interim Wellhead Protection Areas (IWPA)
Approved Wellhead Protection Areas (Zone II)
Surface Water Supply Protection Areas (Zone A)
Surface Water Supply Protection Areas (Zone B)
Surface Water Supply Protection Areas (Zone C)

Map Location

Legend

- Proposed 14" J-2 loop
- Existing J-1 Pipeline
- Existing J-2 Pipeline
- Municipal Boundary
- Staging Areas
- Access Roads

0 500 1,000 2,000 Feet

Scale: 1:24,000
(1 inch = 2,000 ft)

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Groundwater Resources

Data Source: MassGIS Regulated Areas Datalayers.
Image Source: USGS 24k Topographic Quadrangles: Boston North and Boston South, MA.
Map Projection: State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

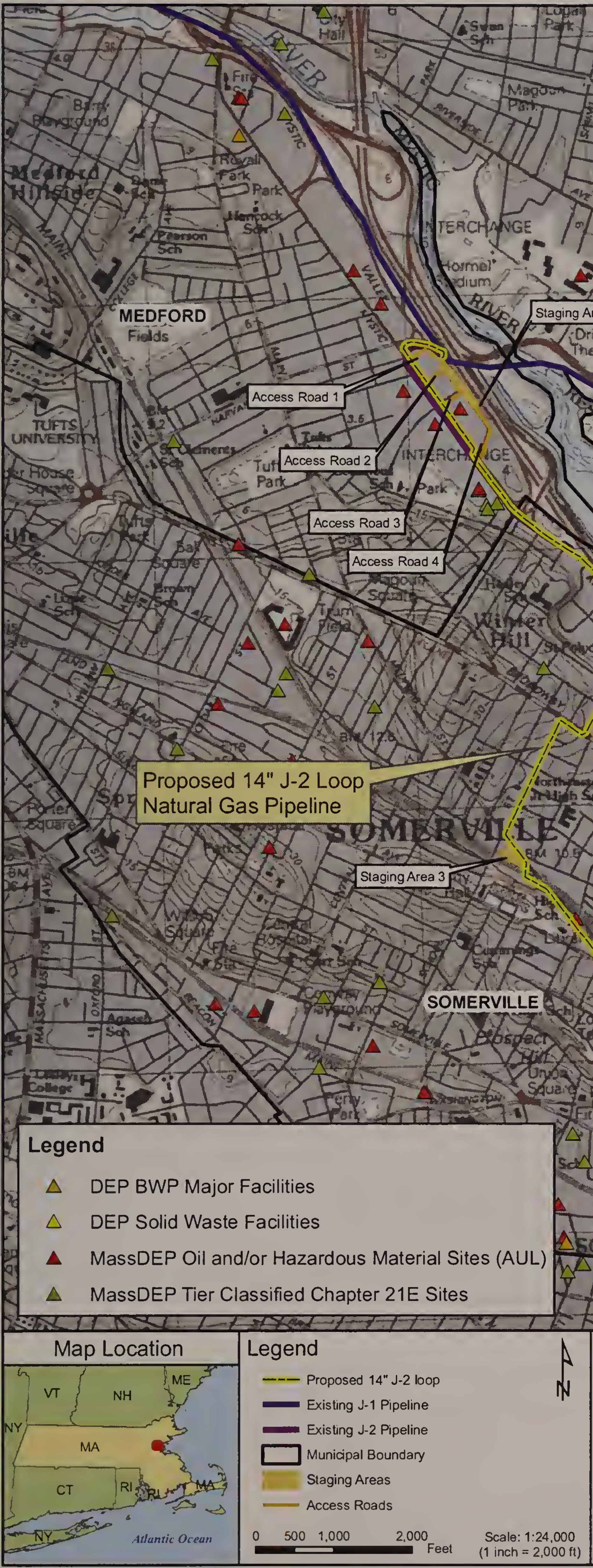
ENSR | AECOM

Figure 2.1-1

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR2\Figure_2-1-1_J-2_Loop_Groundwater_Resources.mxd



**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Federal and State Identified Hazardous Waste Sites

Data Source: MassGIS Regulated Areas Datalayers.
Image Source: USGS 24k Topographic Quadrangles: Boston North and Boston South, MA.
Map Projection: State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

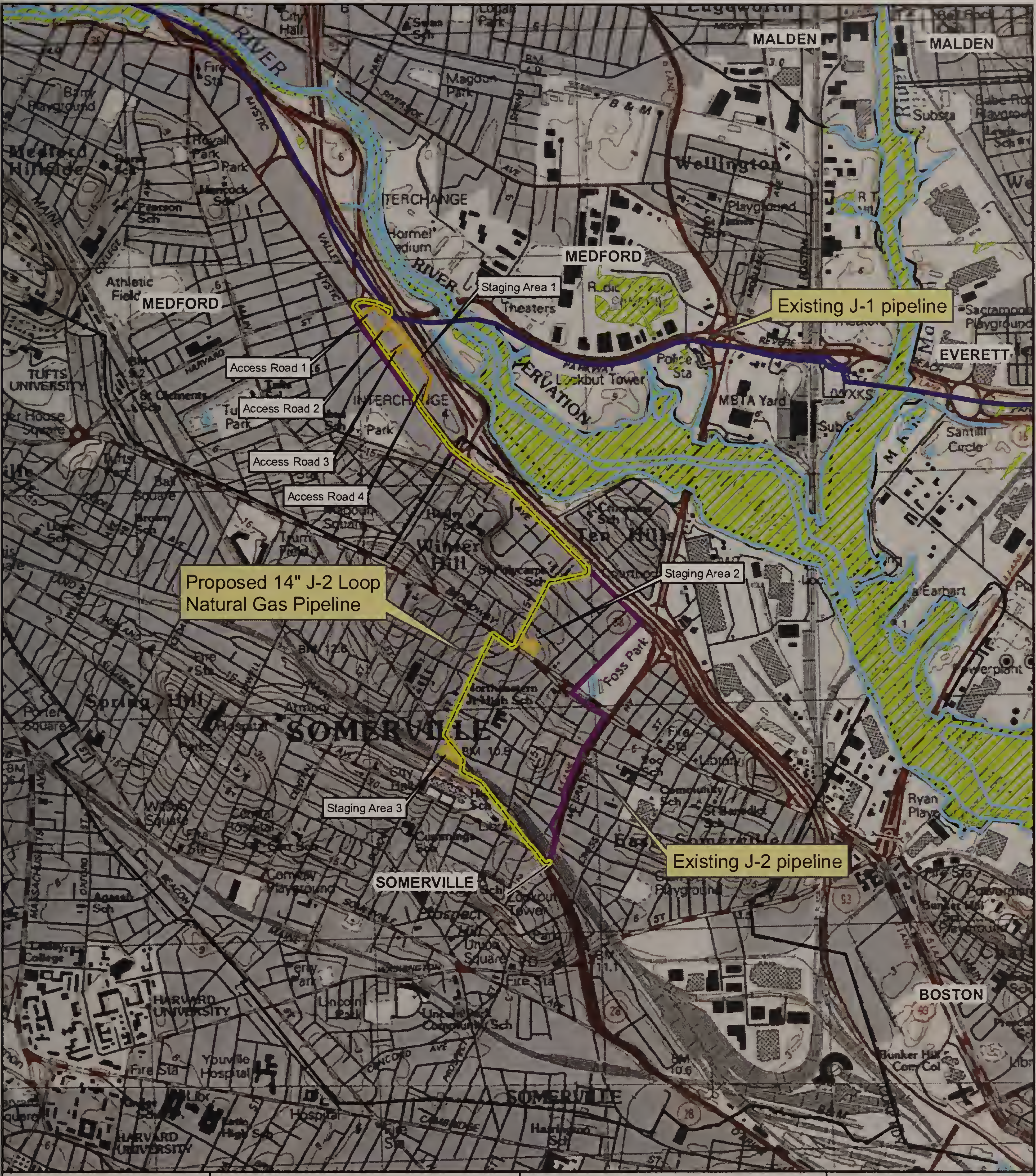
ENSR | AECOM

Figure 2.1-2

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR2\Figure_2-1-2_J-2_Loop_Haz_Waste_Sites.mxd



Map Location

Legend

| | | | |
|---|---|---|---|
| - - - | Proposed 14" J-2 loop | ~ | Rivers and Streams |
| ━ | Existing J-1 Pipeline | ▨ | DEP Wetlands |
| ━ | Existing J-2 Pipeline | ☐ | Municipal Boundary |
| ■ | Staging Areas | | |
| ━ | Access Roads | | |

0 500 1,000 2,000 Feet

Scale: 1:24,000
(1 inch = 2,000 ft)

N

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

DEP Wetlands and Hydrography

Data Source: MassGIS Hydrography & DEP Wetlands Data.
Image Source: USGS 24k Topographic Quadrangles:
Boston North and Boston South, MA.
Map Projection: State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

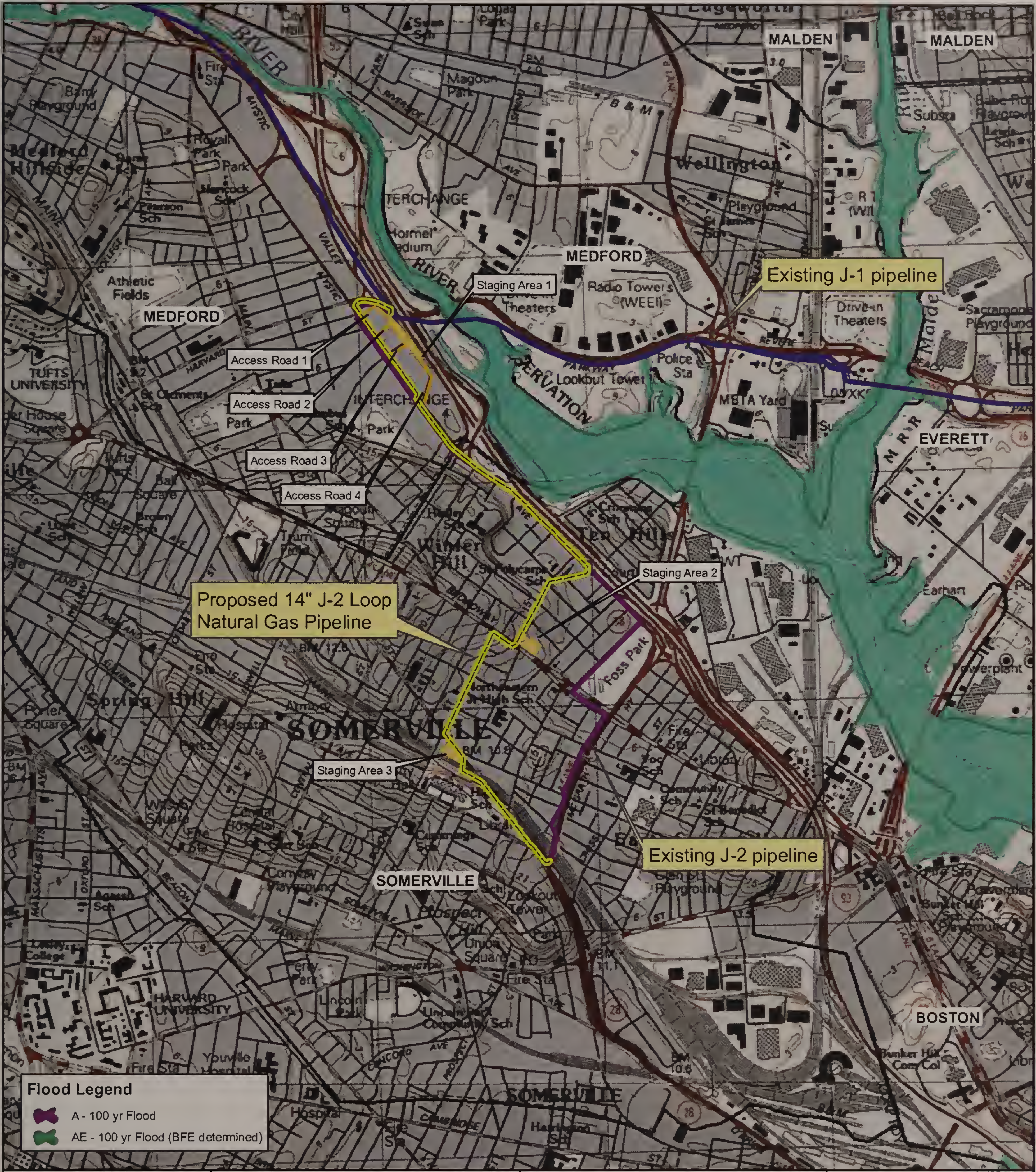
ENSR | AECOM

Figure 2.1-3

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR2\Figure_2-1-3_J-2_Loop_DEP_Wetlands_Hydrography.mxd



Map Location

Legend

- Proposed 14" J-2 loop
- Existing J-1 Pipeline
- Existing J-2 Pipeline
- ☐ Municipal Boundary
- Staging Areas
- Access Roads

0 500 1,000 2,000 Feet

Scale: 1:24,000
(1 inch = 2,000 ft)

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

FEMA Flood Map

Data Source: MassGIS FEMA Q3 Flood Data
Image Source: USGS 24k Topographic Quadrangles: Boston North and Boston South, MA.
Map Projection: State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

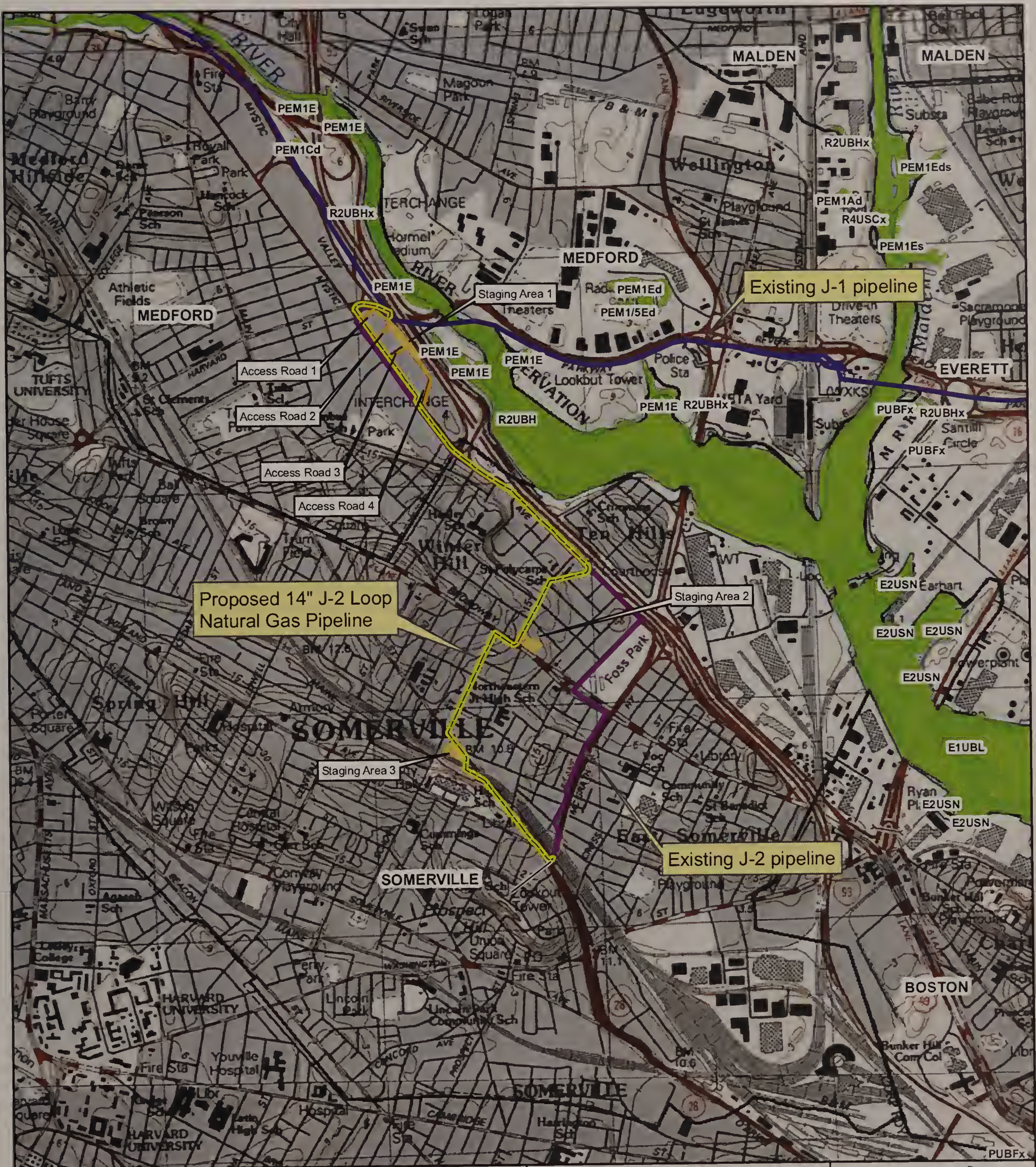
ENSR | AECOM

Figure 2.1-4

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR2\Figure_2-1-4_J-2_Loop_FEMA_Flood_Zones.mxd



## Map Location

## Legend

| | | | |
|---|---|---|---|
| - - - | Proposed 14" J-2 loop | ▨ | Staging Areas |
| ▬ | Existing J-1 Pipeline | ▬ | Access Roads |
| ▬ | Existing J-2 Pipeline | 🟩 | NWI |
| ☐ | Municipal Boundary | | |

0 500 1,000 2,000
Feet

Scale: 1:24,000
(1 inch = 2,000 ft)

N

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

National Wetlands Inventory

Data Source: USFWS NWI Data.
Image Source: USGS 24k Topographic Quadrangles:
Boston North and Boston South, MA.
Map Projection: State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

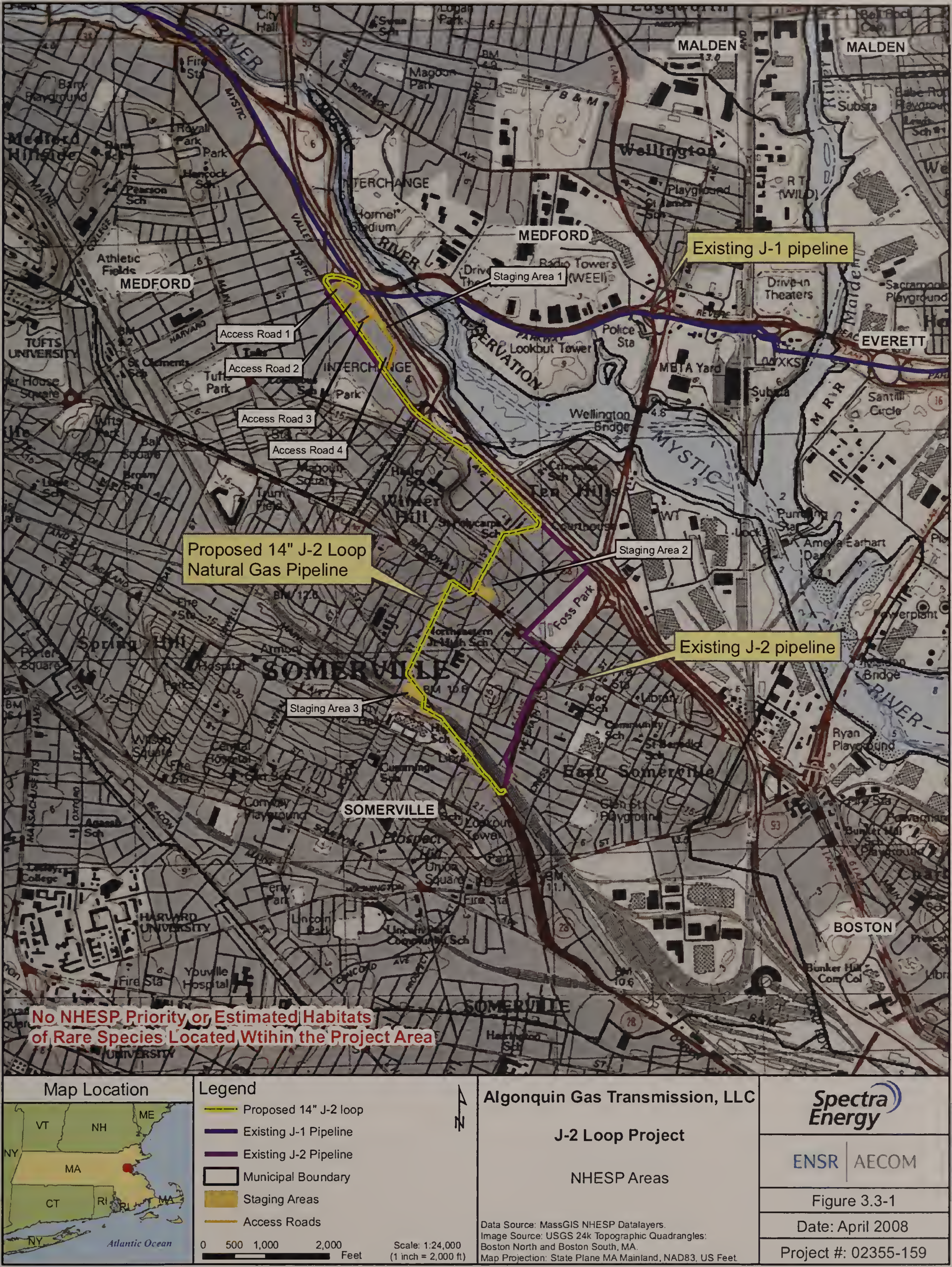
ENSR | AECOM

Figure 2.1-5

Date: April 2008

Project #: 02355-159-100

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR2\Figure_2-1-5_J-2_Loop_NWI.mxd



No NHESP Priority or Estimated Habitats of Rare Species Located Wtihin the Project Area

Legend

- Proposed 14" J-2 loop
- Existing J-1 Pipeline
- Existing J-2 Pipeline
- Municipal Boundary
- Staging Areas
- Access Roads

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

NHESP Areas

Data Source: MassGIS NHESP Datalayers.
Image Source: USGS 24k Topographic Quadrangles: Boston North and Boston South, MA.
Map Projection: State Plane MA Mainland, NAD83, US Feet

Spectra Energy

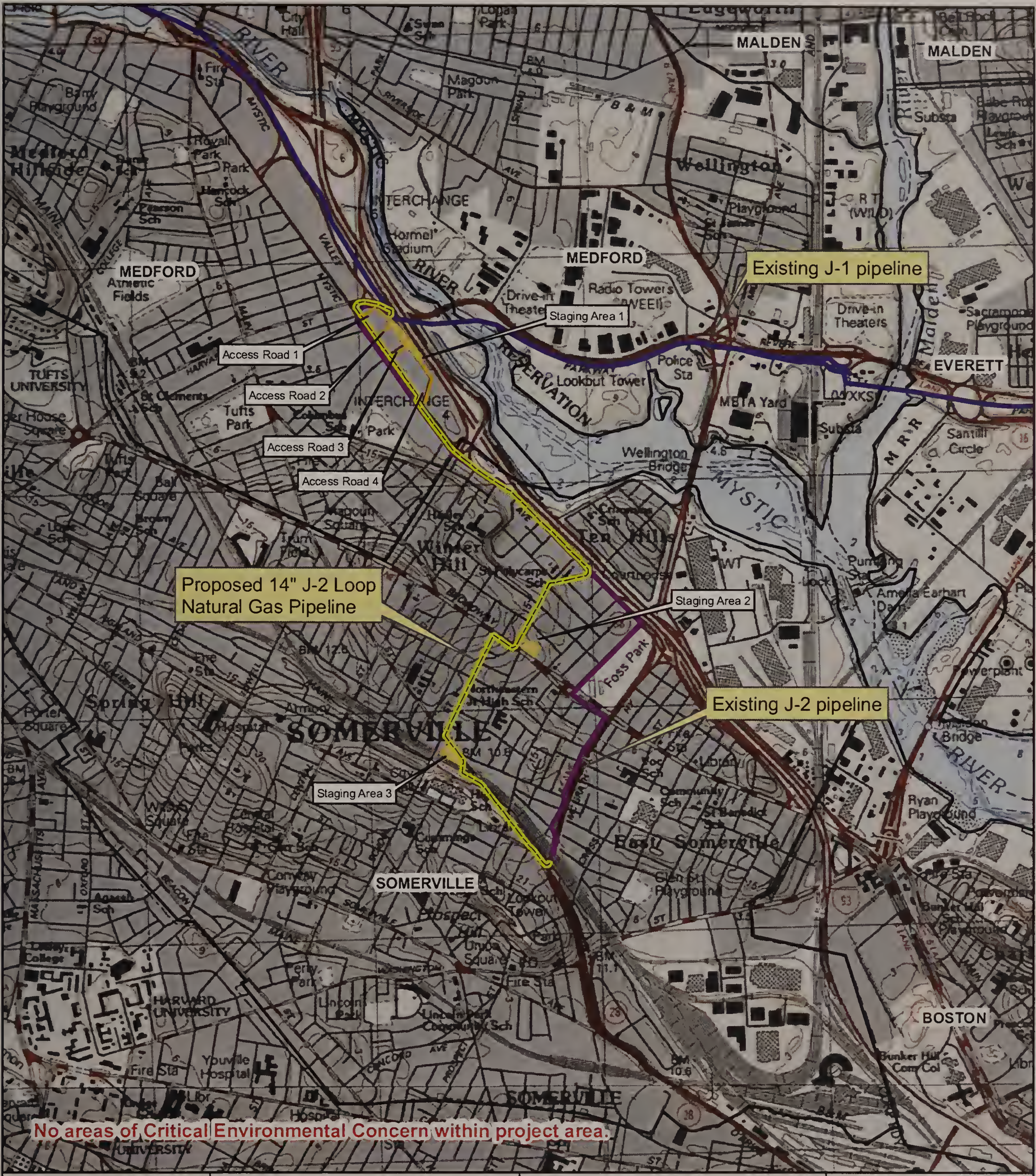
ENSR | AECOM

Figure 3.3-1

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR3\Figure_3-3-1_J-2_Loop_NHESP_Areas.mxd



No areas of Critical Environmental Concern within project area.

Map Location

Legend

- Proposed 14" J-2 loop
- Existing J-1 Pipeline
- Existing J-2 Pipeline
- Municipal Boundary
- Staging Areas
- Access Roads

0 500 1,000 2,000 Feet

Scale: 1:24,000 (1 inch = 2,000 ft)

N

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Areas of Critical Environmental Concern

Data Source: MassGIS ACEC Data.
Image Source: USGS 24k Topographic Quadrangles: Boston North and Boston South, MA.
Map Projection: State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

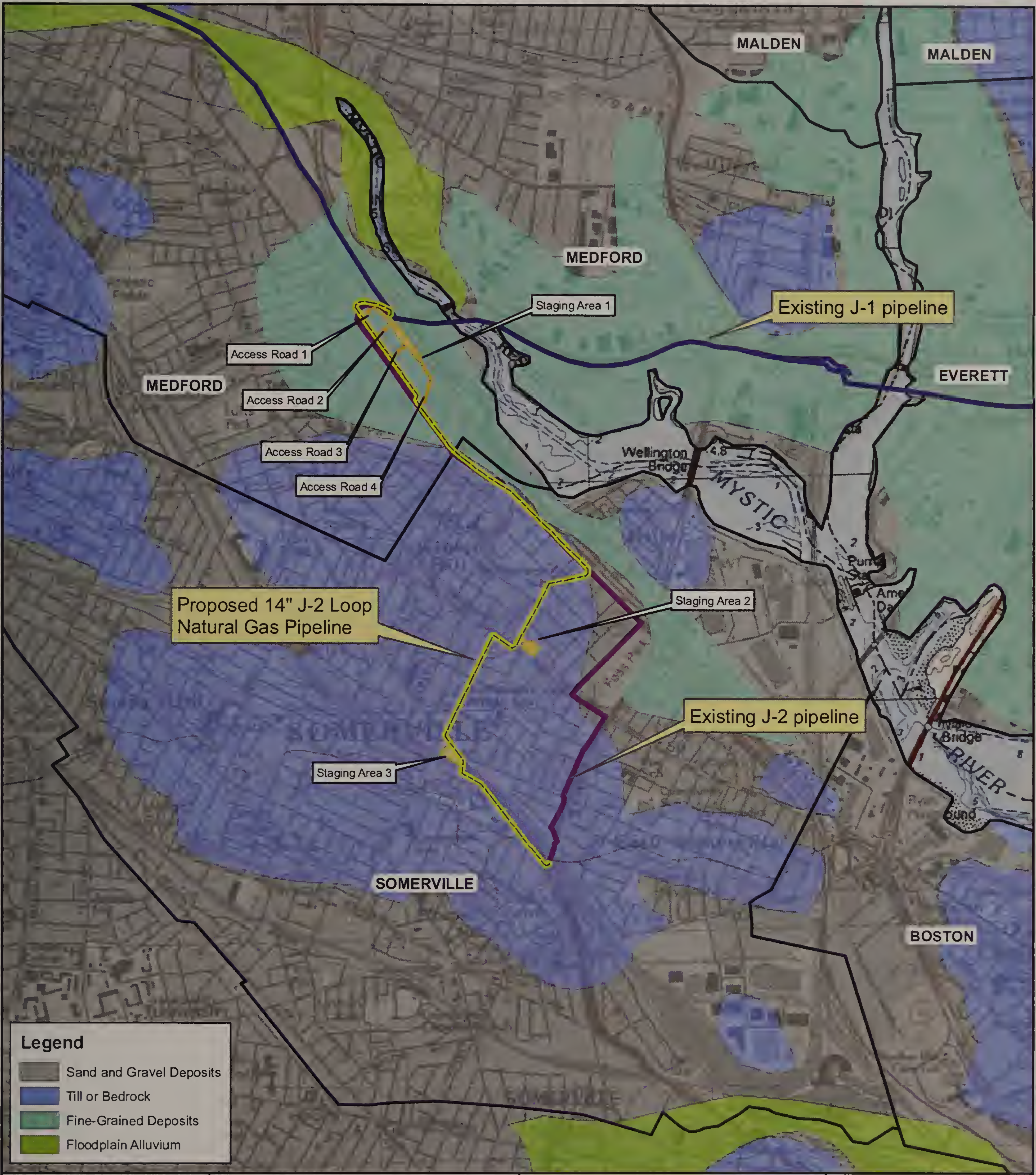
ENSR | AECOM

Figure 3.3-2

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR3\Figure_3-3-2_J-2_Loop_Areas_of_Critical_Concern.mxd



Map Location

Legend

- Proposed 14" J-2 loop
- Existing J-1 Pipeline
- Existing J-2 Pipeline
- ☐ Municipal Boundary
- Staging Areas
- Access Roads

0 500 1,000 2,000 Feet

Scale: 1:24,000 (1 inch = 2,000 ft)

N

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Surficial Geology

Data Source: MassGIS Surficial Geology Data.
Image Source: USGS 24k Topographic Quadrangles: Boston North and Boston South, MA.
Map Projection: State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

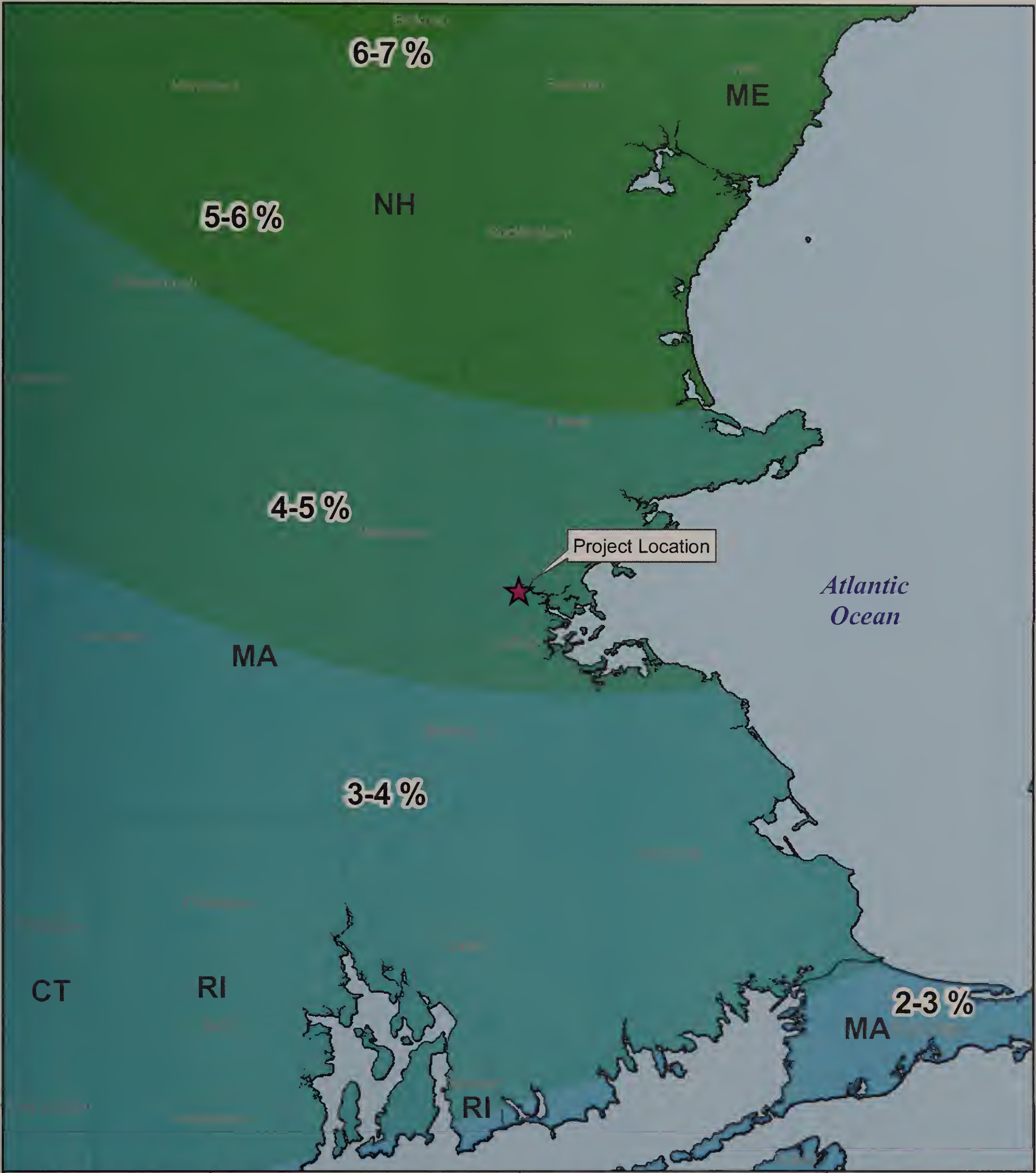
ENSR | AECOM

Figure 6.1-1

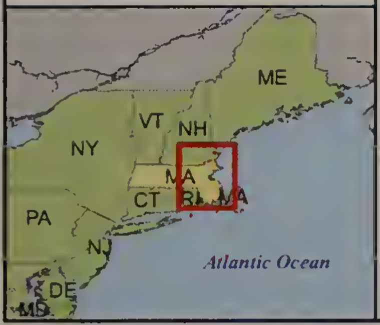
Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR6\Figure_6-1-1_J-2_Loop_Surficial_Geology.mxd



Map Location



Legend

Peak Acceleration Exprressed as % of Gravity

%G
- 🟦 0-1
- 🟦 1-2
- 🟦 2-3
- 🟦 3-4
- 🟩 4-5
- 🟩 5-6
- 🟩 6-7
- 🟩 7-8
- 🟩 8-9
- 🟩 9-10
- 🟩 10-15
- 🟩 15-20
- 🟨 20-25
- 🟨 25-30
- 🟨 30-40
- 🟧 40-60
- 🟧 60-80
- 🟥 80-100
- 🟥 > 100

0 5 10 Miles

Scale: 1:1,000,000

N

**Algonquin Gas Transmission, LLC**
**J-2 Loop Project**

Seismic Hazard Map
Peak Horizontal Acceleration
With 10% Probablility
of Exceedence in 50 Years

Data Source: USGS Earthquake Hazards Program Data.
Image Source: USGS 24k Topographic Quadrangles: Boston North and Boston South, MA.
Map Projection: State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

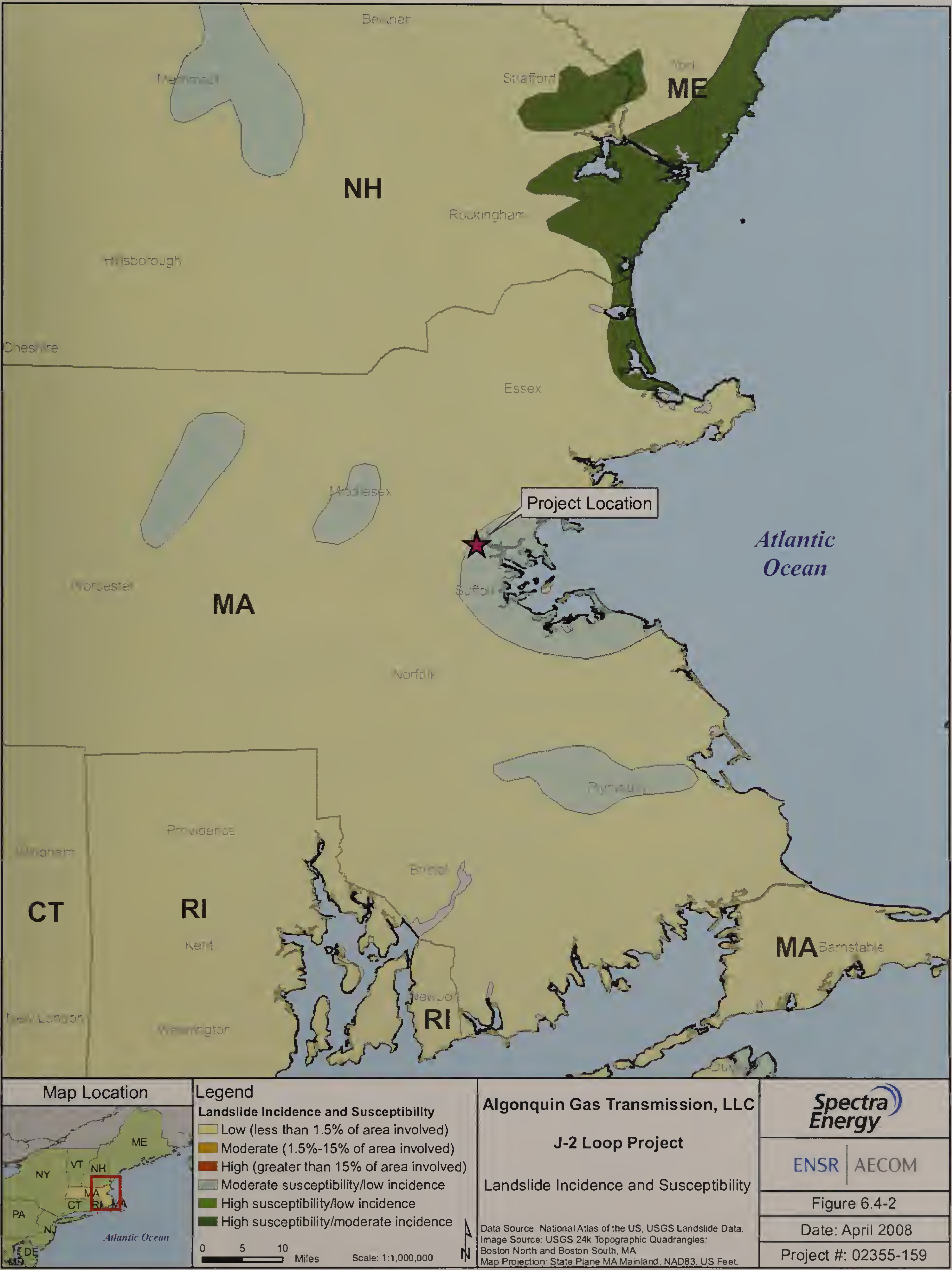
ENSR | AECOM

Figure 6.4-1

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR6\Figure_6-4-1_J-2_Loop_Seismic_Zones.mxd



**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Landslide Incidence and Susceptibility

Data Source: National Atlas of the US, USGS Landslide Data.
Image Source: USGS 24k Topographic Quadrangles:
Boston North and Boston South, MA.
Map Projection: State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

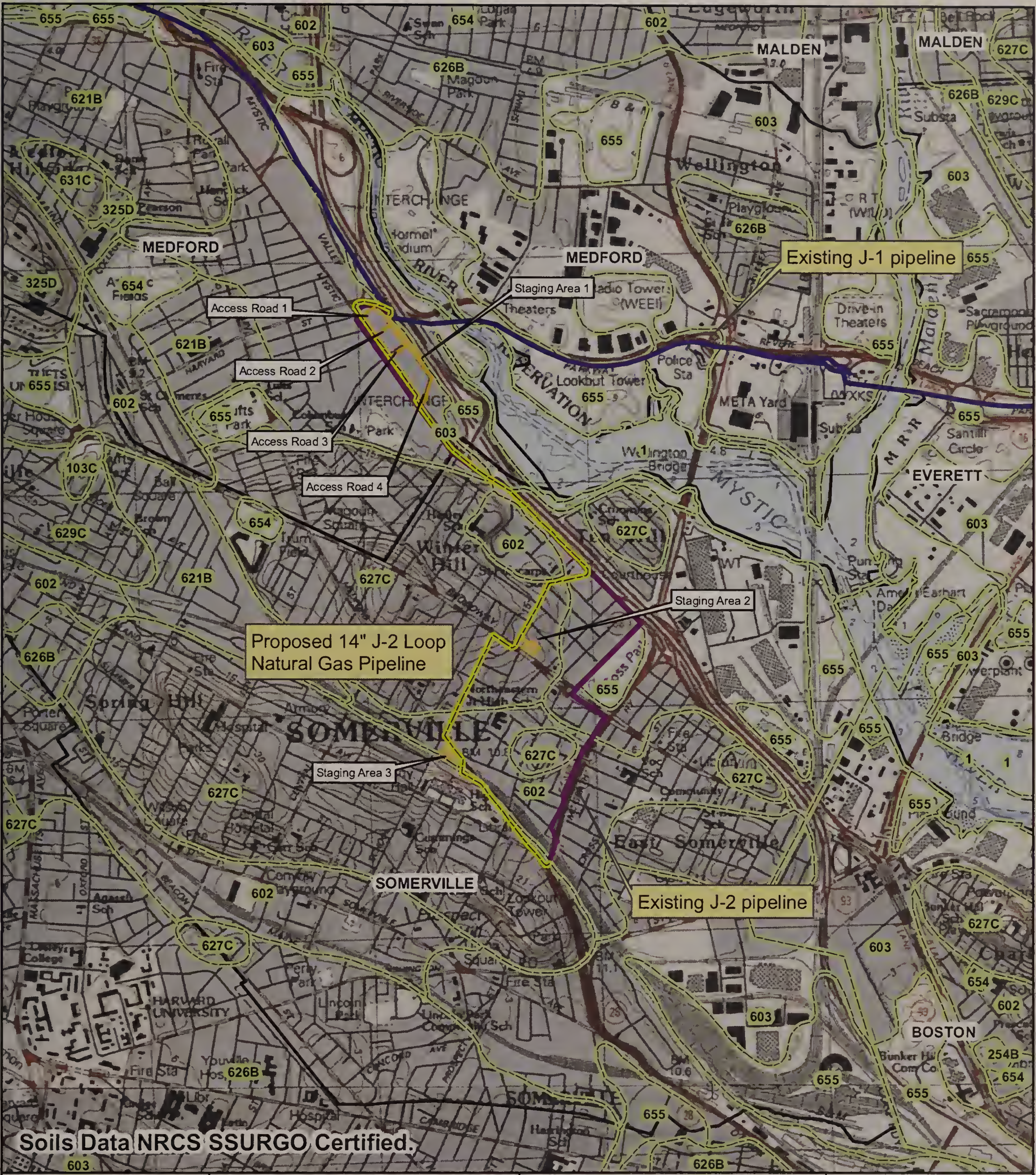
ENSR | AECOM

Figure 6.4-2

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR6\Figure_6-4-2_J-2_Loop_Landslide_Potential.mxd



## Map Location

## Legend

- Proposed 14" J-2 loop
- Existing J-1 Pipeline
- Existing J-2 Pipeline
- ☐ Municipal Boundary
- Staging Areas
- Access Roads
- Soils

N

0 500 1,000 2,000 Feet

Scale: 1:24,000
(1 inch = 2,000 ft)

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Soils Map

Data Source: MassGIS Soils Data - NRCS SSURGO Certified.
Image Source: USGS 24k Topographic Quadrangles:
Boston North and Boston South, MA.
Map Projection: State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

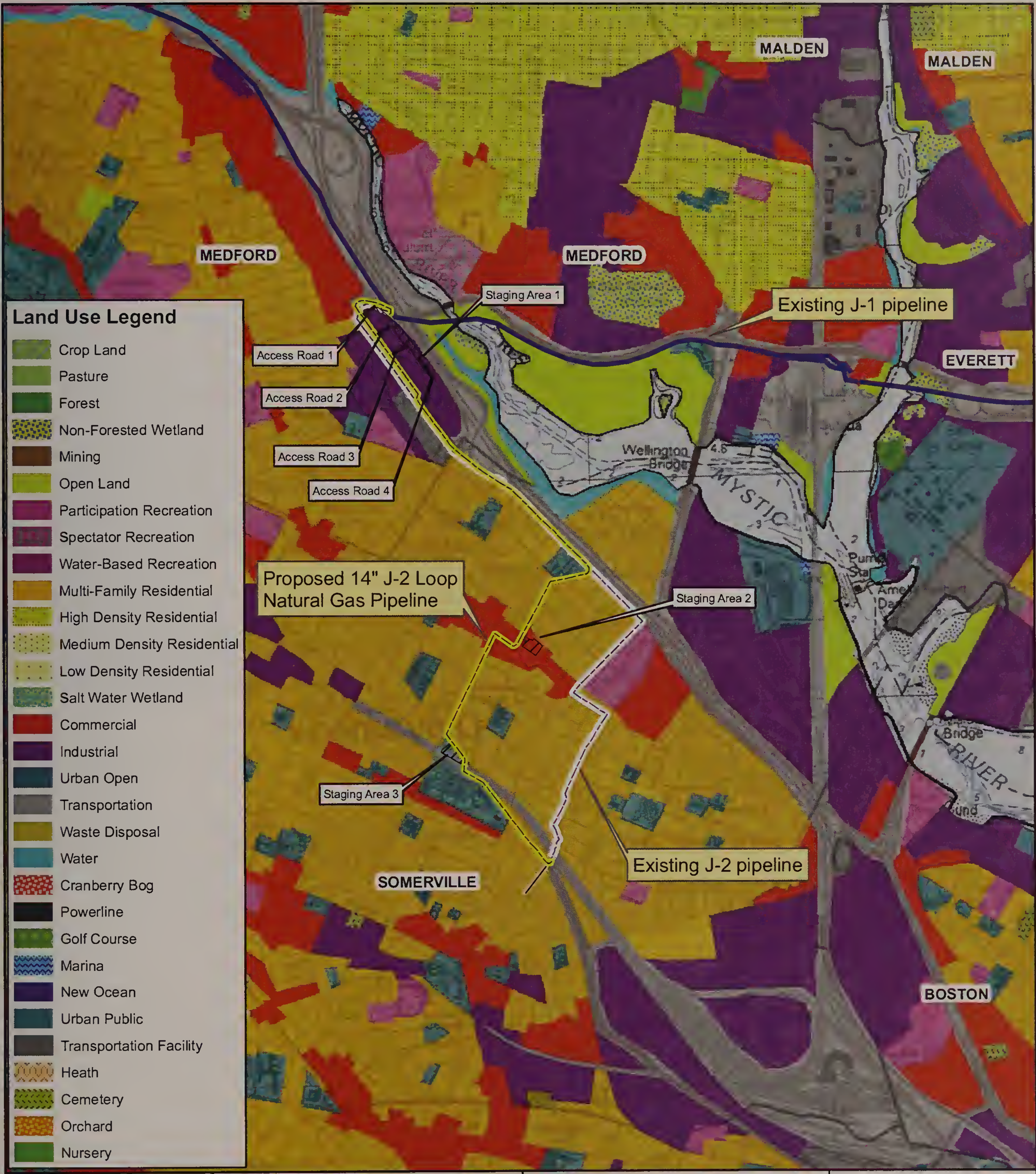
ENSR | AECOM

Figure 7.1-1

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR7\Figure_7-1-1_J-2_Loop_SSURGO_Soils.mxd



Map Location

Legend

- Proposed 14" J-2 loop
- Existing J-1 Pipeline
- Existing J-2 Pipeline
- Municipal Boundary
- Staging Areas
- Access Roads

N

0 500 1,000 2,000 Feet

Scale: 1:24,000
(1 inch = 2,000 ft)

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Land Use

Data Source: MassGIS Land Use Data.
Image Source: USGS 24k Topographic Quadrangles:
Boston North and Boston South, MA.
Map Projection: State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

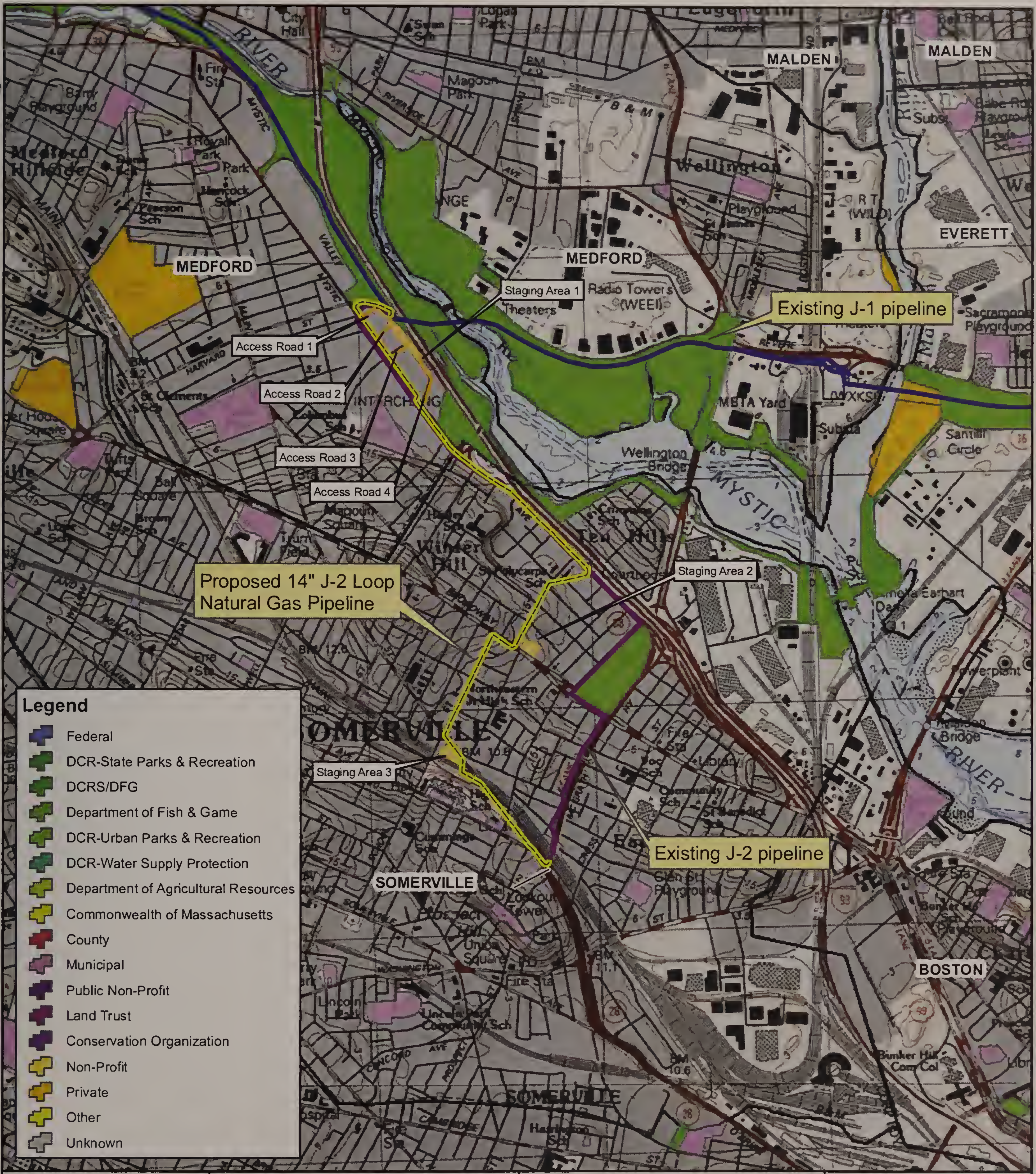
ENSR | AECOM

Figure 8.1-1

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR8\Figure_8-1-1_J-2_Loop_Land_Use.mxd



Map Location

Legend

- Proposed 14" J-2 loop
- Existing J-1 Pipeline
- Existing J-2 Pipeline
- Municipal Boundary
- Staging Areas
- Access Roads

0 500 1,000 2,000 Feet

Scale: 1:24,000
(1 inch = 2,000 ft)

N

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Protected and Recreational
Open Space

Data Source: MassGIS Prot/Rec Open Space Data.
Image Source: USGS 24k Topographic Quadrangles:
Boston North and Boston South, MA.
Map Projection: State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

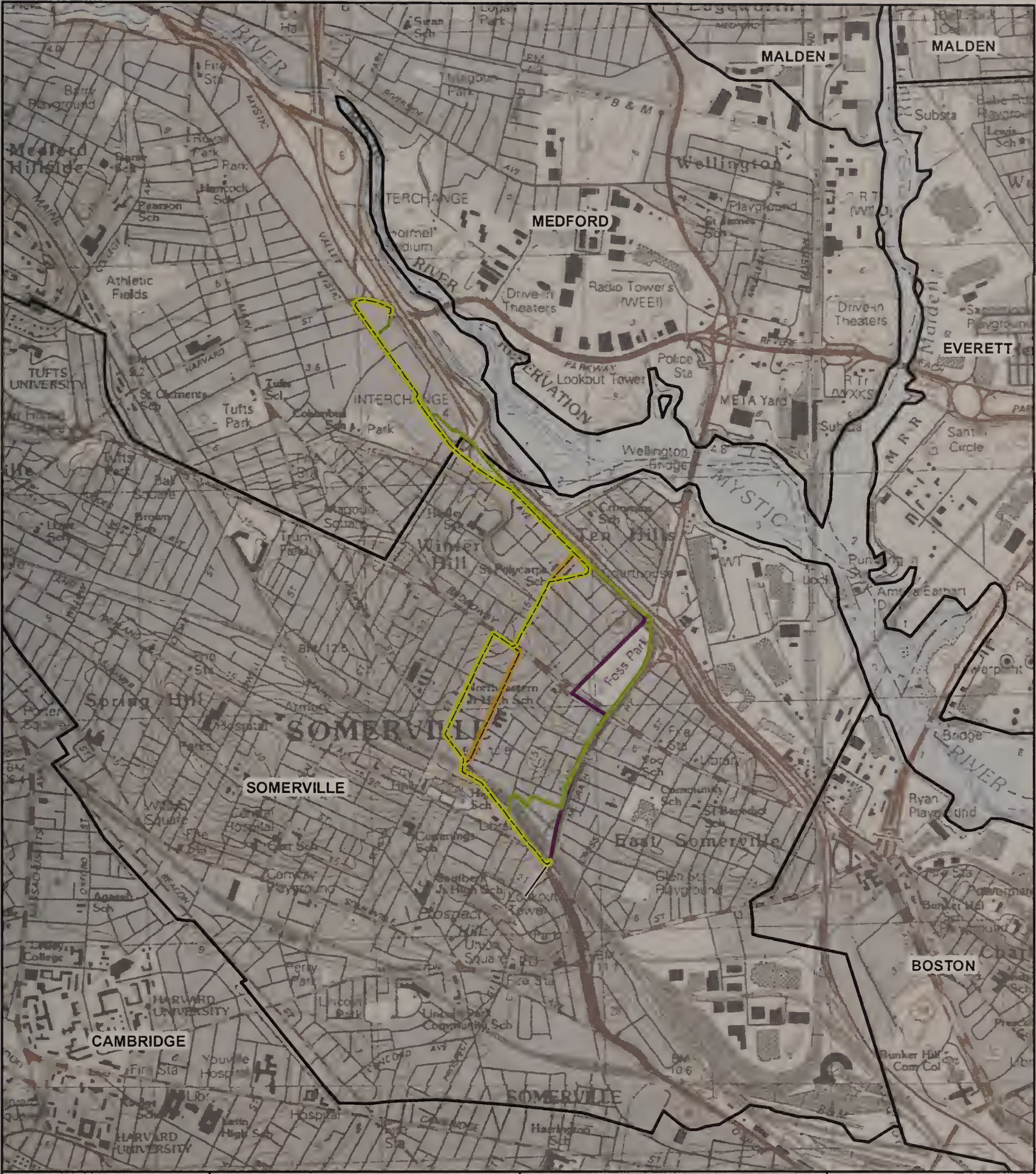
ENSR | AECOM

Figure 8.3-1

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR8\Figure_8.3-1_J-2_Loop_Protected-Recreation_Open_Space.mxd



**Map Location**

**Legend**

- Proposed 14" J-2 loop
- Alternative Route A
- Alternative Route B
- Alternative Route C

0 500 1,000 2,000 Feet

Scale: 1:24,000
(1 inch = 2,000 ft)

N

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Alternatives

Image Source: USGS 24k Topographic Quadrangles:
Boston North and Boston South, MA
Map Projection: State Plane MA Mainland, NAD83, US Feet

Spectra Energy

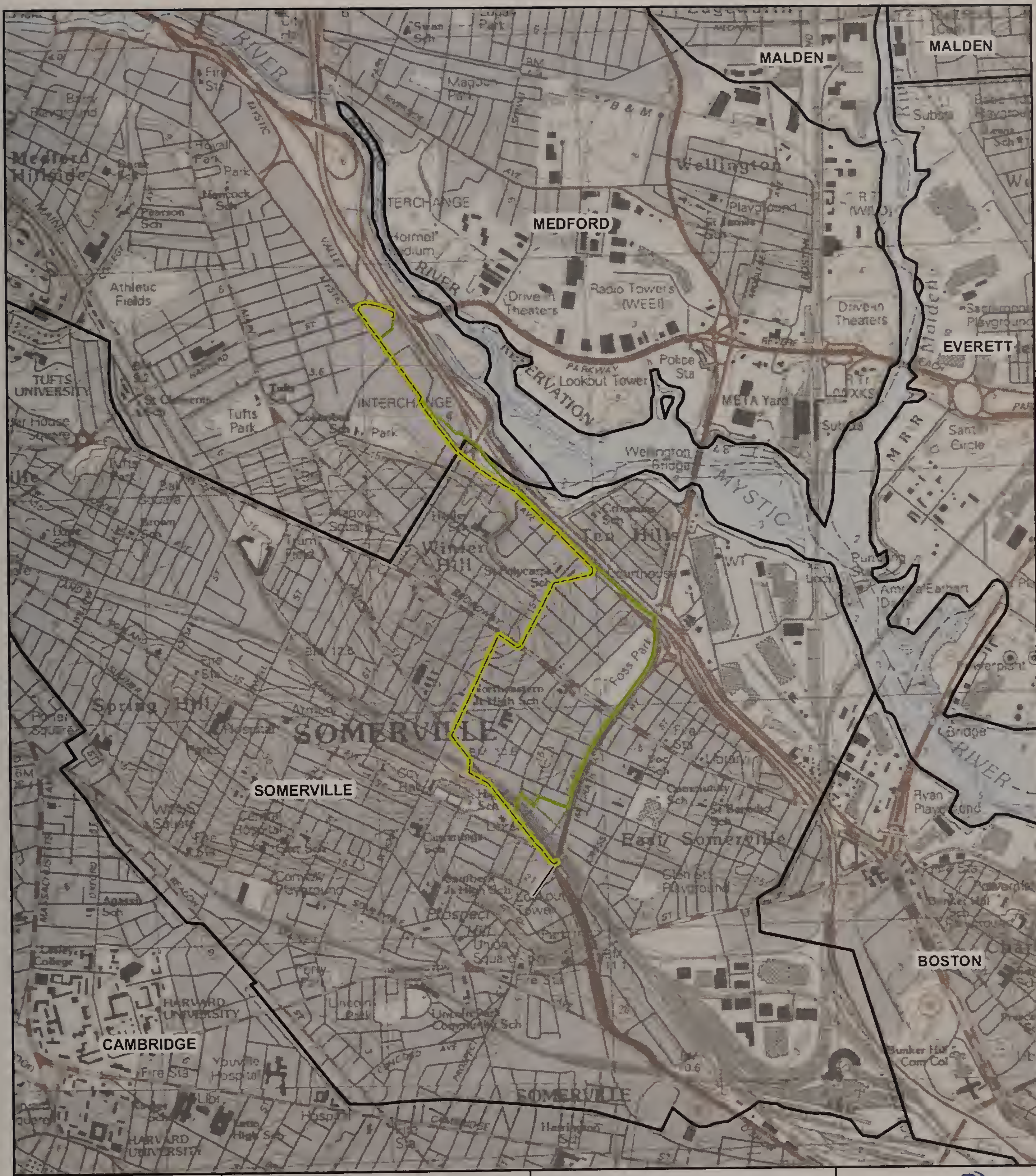
ENSR | AECOM

Figure 10.3-1a

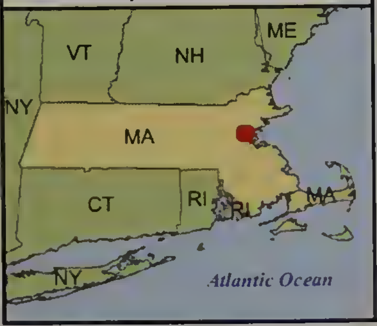
Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR10\Figure_10-3-1a_J-2_Loop_Alternatives_Overview.mxd



Map Location



**Legend**

- Proposed 14" J-2 Loop
- Alternative Route A

0 500 1,000 2,000 Feet

Scale: 1:24,000
(1 inch = 2,000 ft)

N

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Alternatives

Image Source: USGS 24k Topographic Quadrangles:
Boston North and Boston South, MA
Map Projection: State Plane MA Mainland, NAD83, US Feet

Spectra Energy

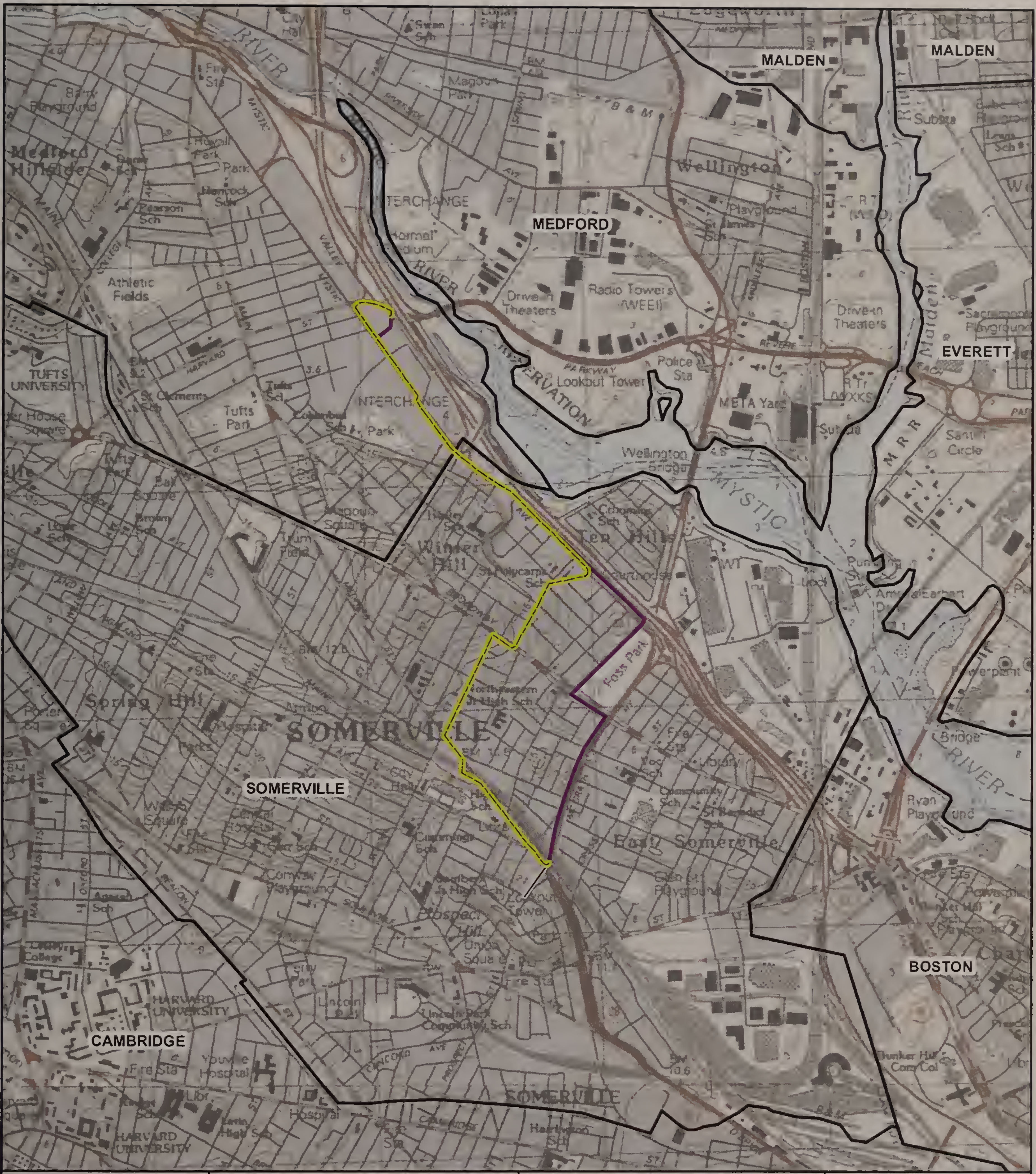
ENSR | AECOM

Figure 10.3-1b

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR10\Figure_10-3-1b_J-2_Loop_Alternative_A.mxd



Map Location

**Legend**

Proposed 14" J-2 Loop

Alternative Route B

N

0 500 1,000 2,000 Feet

Scale: 1:24,000
(1 inch = 2,000 ft)

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Alternatives

Image Source: USGS 24k Topographic Quadrangles
Boston North and Boston South, MA
Map Projection: State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

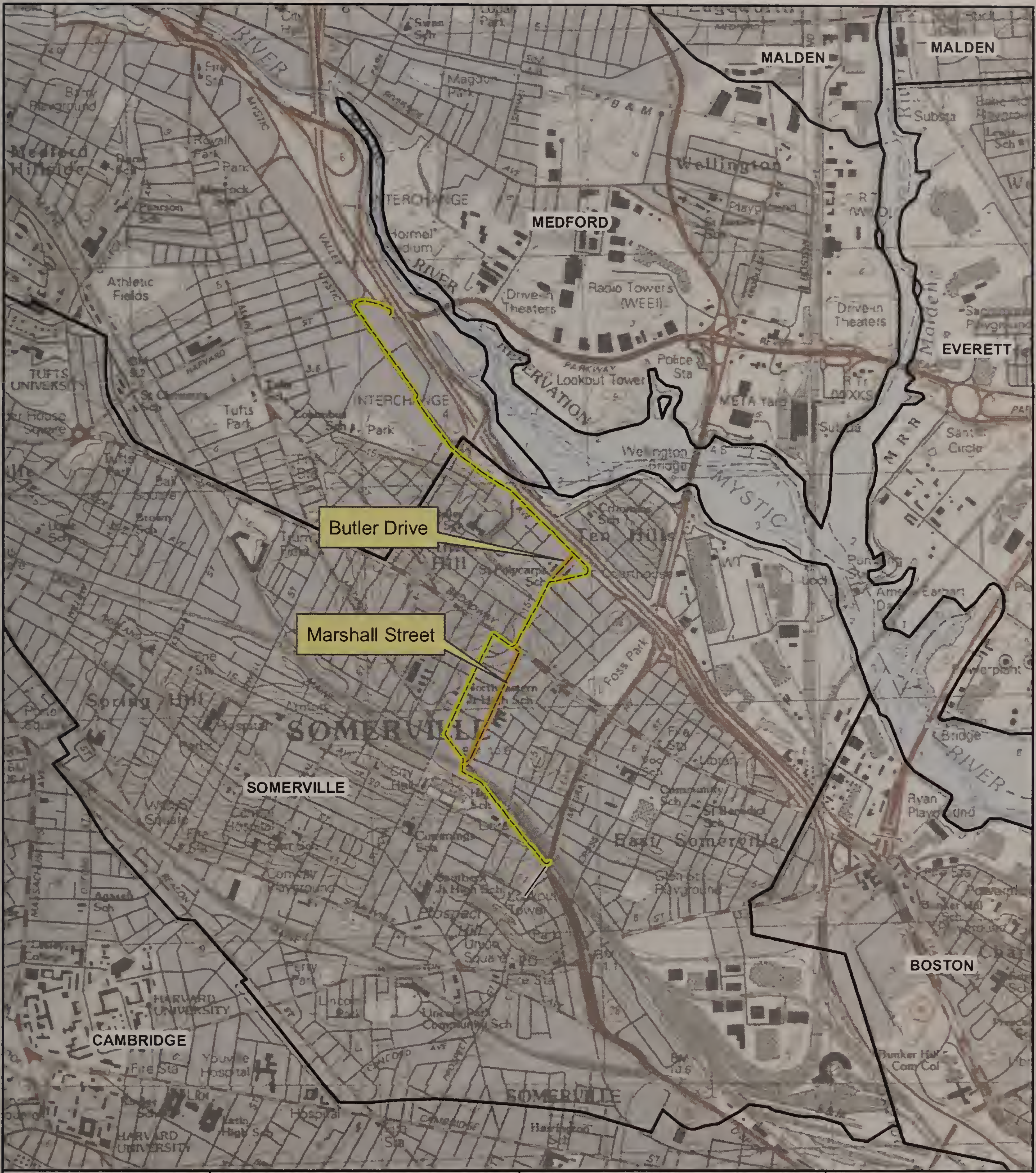
ENSR | AECOM

Figure 10.3-1c

Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR10\Figure_10-3-1c_J-2_Loop_Alternative_B.mxd



Map Location

**Legend**

- Proposed 14" J-2 Loop
- Alternative Route C

0 500 1,000 2,000 Feet

Scale: 1:24,000 (1 inch = 2,000 ft)

N

**Algonquin Gas Transmission, LLC**

**J-2 Loop Project**

Alternatives

Image Source. USGS 24k Topographic Quadrangles: Boston North and Boston South, MA.
Map Projection. State Plane MA Mainland, NAD83, US Feet.

Spectra Energy

ENSR | AECOM

Figure 10.3-1d

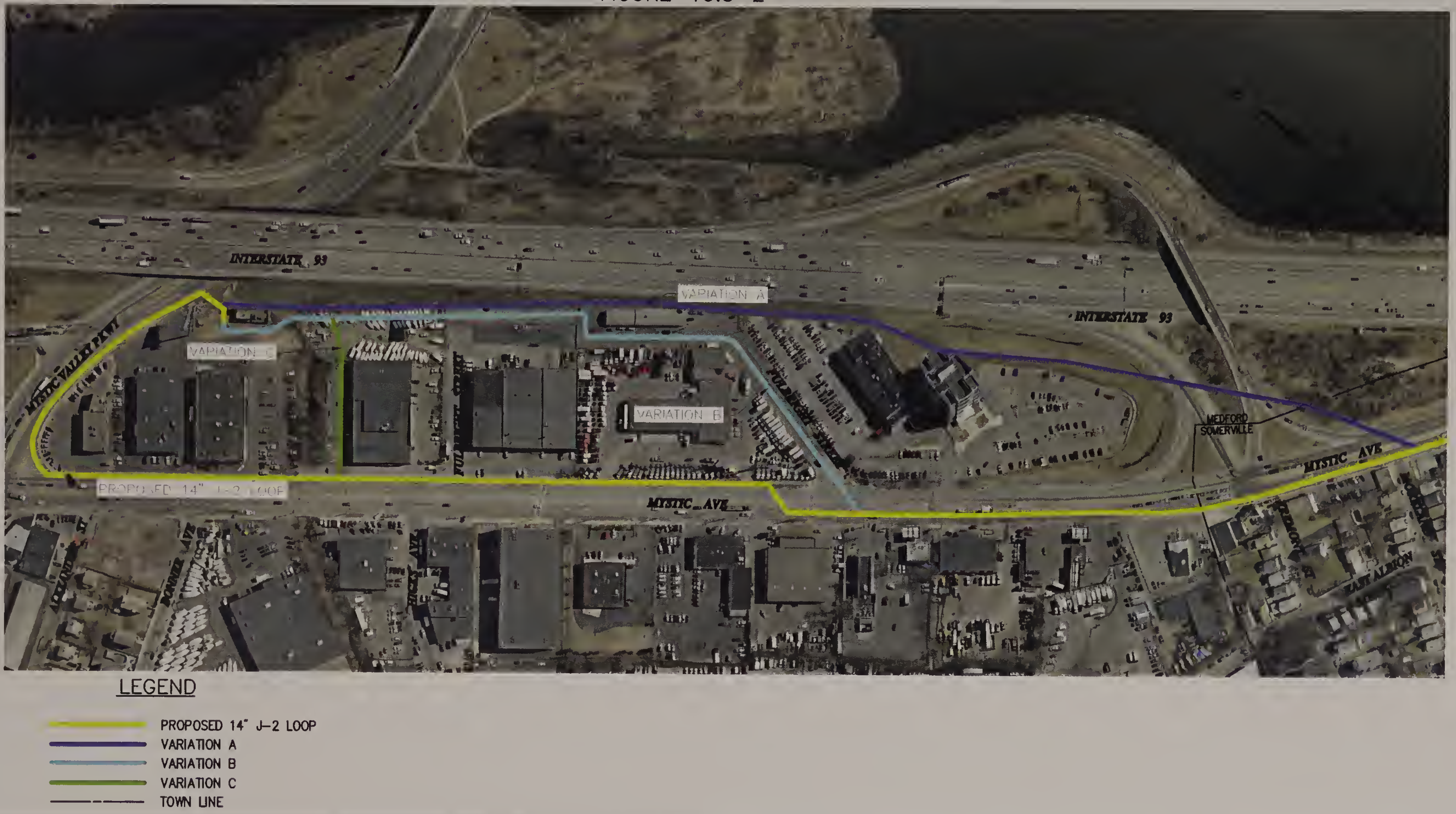
Date: April 2008

Project #: 02355-159

Y:\Projects\Spectra\J-2_Pipeline_Project\MXD\FERC\RR10\Figure_10-3-1d_J-2_Loop_Alternative_C.mxd

Model: $MODELNAME$
Time: $$$$USERNAME$$$$

FIGURE–10.3–2




Drawing: $$$$$$$$$$$$$$$$$$$$$$$$$$$$DGNSPEC$$$$$$$$$$$$$$$$$$$$$$$$$$
Time: $$$$$SYTIME$$$$$

| IG.# | REV.# | DESCRIPTION | DATE |
|---|---|---|---|

VHB
Vanasse Hangen Brustlin, Inc.
Transportation
Land Development
Environmental Services
101 Walnut Street, P.O. Box 9151
Watertown, Massachusetts 02471 9151
617 924 1770 · FAX 617 924 2286

PROJ. ENG. D.C.N.
CHECKED BY: D.C.N.
DRAWN BY: [illegible]
SCALE: 1"=[illegible]
APRIL 22

TITLE: ROUTE VARIATIONS
J-2 LOOP PROJECT
LOC.: MEDFORD MA
REV. A
YR.: 2008
W.O. 004110598
DWG. NO. Z–2018

Spectra Energy
Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

Spectra Energy

# *Appendix B – Agency Correspondence*

ENSR | AECOM

ENSR
[illegible]
[illegible]

October 18, 2007

U.S. Fish and Wildlife Service
New England Field Office
Mr. Anthony P. Tur
70 Commercial Street, Suite 300
Concord, NH 03301-5087

Re: Rare Species Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Tur:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- Officially designated wilderness areas
- Officially designated wildlife preserves
- Species designated as threatened or endangered or designated critical habitats
- Species proposed for designation as endangered or threatened or proposed designated critical habitats.

This request specifically addresses the requirement for documented consultation in regard to compliance with the Endangered Species Act of 1973 required under the FERC application process. We request consultation from your office regarding the occurrence of any threatened and/or endangered species (T&E) and/or their critical habitats within the project areas depicted on the attached USGS topographic figures. Should you have any questions regarding this request, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

November 21, 2007

| Reference: | Project | Location |
|---|---|---|
| | Pipeline expansion | Medford, Somerville, MA |

John Zimmer
ENSR Corporation
95 State Road
Sagamore Beach, MA 02562-2415

Dear Mr. Zimmer:

This responds to your recent correspondence requesting information on the presence of federally-listed and/or proposed endangered or threatened species in relation to the proposed activity(ies) referenced above.

Based on information currently available to us, no federally-listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area(s). Preparation of a Biological Assessment or further consultation with us under Section 7 of the Endangered Species Act is not required.

This concludes our review of listed species and critical habitat in the project location(s) and environs referenced above. No further Endangered Species Act coordination of this type is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

In order to curtail the need to contact this office in the future for updated lists of federally-listed or proposed threatened or endangered species and critical habitats, please visit the Endangered Species Consultation page on the New England Field Office's website:

www.fws.gov/northeast/newenglandfieldoffice/EndangeredSpec-Consultation.htm

In addition, there is a link to procedures that may allow you to conclude if habitat for a listed species is present in the project area. If no habitat exists, then no federally-listed species are present in the project area and there is no need to contact us for further consultation. If the above conclusion cannot be reached, further consultation with this office is advised. Information describing the nature and location of the proposed activity that should be provided to us for further informal consultation can be found at the above-referenced site.

Thank you for your coordination. Please contact us at 603-223-2541 if we can be of further assistance.

Sincerely yours,

Anthony P. Tur
Endangered Species Specialist
New England Field Office

ENSR | AECOM

ENSR
[illegible]
[illegible]

February 22, 2008

U.S. Fish and Wildlife Service
New England Field Office
Mr. Anthony P. Tur
70 Commercial Street, Suite 300
Concord, NH 03301-5087

Re: Rare Species Information Request
J-2 Loop Project – Route Modifications
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Tur:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, consulted with the U.S. Fish and Wildlife Service regarding the presence of federally-listed and/or proposed endangered or threatened species potentially occurring within the proposed J-2 Loop Project corridor in October of 2007. The J-2 Loop Project consists of the construction and installation of approximately two miles of new 14-inch outside diameter ("OD") natural gas loop pipeline within the cities of Medford and Somerville, Massachusetts. On November 21, 2007, the U.S. Fish and Wildlife Service provided written consultation regarding the J-2 Project, and determined that no federally-listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are know to occur in the project area. Since receipt of this consultation, Algonquin has modified portions of the original J-2 Loop Project alignment.

The modified route will commence at an existing meter station located adjacent to the Mystic Valley Parkway in Medford. The Project will then continue south paralleling Interstate 93 to the corridor of Mystic Avenue. The alignment will then continue generally south and east within the Temple, Broadway, School, and Medford Street corridors to a terminus at an existing valve site located east of the McGrath Highway (Route 28) / Conrail overpass in Somerville. Please refer to the attached figure for a USGS topographic map depicting Algonquin's existing pipeline facilities as well as the modified J-2 Loop alignment.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- Officially designated wilderness areas
- Officially designated wildlife preserves
- Species designated as threatened or endangered or designated critical habitats

- Species proposed for designation as endangered or threatened or proposed designated critical habitats.

This request specifically addresses the requirement for documented consultation in regard to compliance with the Endangered Species Act of 1973 required under the FERC application process. We request consultation from your office regarding the occurrence of any threatened and/or endangered species (T&E) and/or their critical habitats within the project areas depicted on the attached USGS topographic figure. Should you have any questions regarding this request, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087
http://www.fws.gov/northeast/newenglandfieldoffice

March 27, 2008

| Reference: | Project | Location |
|---|---|---|
| | Pipeline expansion modifications | Somerville, Medford, MA |

John Zimmer
ENSR Corporation
95 State Road
Sagamore Beach, MA 02562-2415

Dear Mr. Zimmer:

This responds to your recent correspondence requesting information on the presence of federally-listed and/or proposed endangered or threatened species in relation to the proposed activity(ies) referenced above.

Based on information currently available to us, no federally-listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area(s). Preparation of a Biological Assessment or further consultation with us under Section 7 of the Endangered Species Act is not required.

This concludes our review of listed species and critical habitat in the project location(s) and environs referenced above. No further Endangered Species Act coordination of this type is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

In order to curtail the need to contact this office in the future for updated lists of federally-listed or proposed threatened or endangered species and critical habitats, please visit the Endangered Species Consultation page on the New England Field Office's website:

www.fws.gov/northeast/newenglandfieldoffice/EndangeredSpec-Consultation.htm

In addition, there is a link to procedures that may allow you to conclude if habitat for a listed species is present in the project area. If no habitat exists, then no federally-listed species are present in the project area and there is no need to contact us for further consultation. If the above conclusion cannot be reached, further consultation with this office is advised. Information describing the nature and location of the proposed activity that should be provided to us for further informal consultation can be found at the above-referenced site.

Thank you for your coordination. Please contact us at 603-223-2541 if we can be of further assistance.

Sincerely yours,

Anthony P. Tur

Anthony P. Tur
Endangered Species Specialist
New England Field Office

ENSR | AECOM

ENSR
[illegible]
[illegible]

October 18, 2007

MA Department of Conservation and Recreation
Mr. Karst Hoogeboom
Deputy Commissioner of Planning and Engineering
251 Causeway Street – Suite 600
Boston, MA 02114

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Hoogeboom:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- State designated wild or scenic rivers
- Lands administered by state agencies
- Any state-designated natural, recreational, scenic areas
- Any state-designated or administered natural landmarks or visually-sensitive areas

On behalf of Algonquin, ENSR requests that the Massachusetts Department of Conservation and Recreation conduct a preliminary review its records to identify whether the proposed pipeline will be located within or adjacent to any of the above-referenced areas and provide written comments relative to the identified resources. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
*Sr. Project Manager*

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

ENSR | AECOM

ENSR
[illegible]
[illegible]

February 22, 2008

MA Department of Conservation and Recreation
Mr. Karst Hoogeboom
Deputy Commissioner of Planning and Engineering
251 Causeway Street – Suite 600
Boston, MA 02114

Re: Information Request
J-2 Loop Project – Route Modifications
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Hoogeboom:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, consulted with the Massachusetts Department of Conservation and Recreation regarding the occurrence of sensitive environmental areas potentially occurring within the proposed J-2 Loop Project corridor in October of 2007. The J-2 Loop Project consists of the construction and installation of approximately two miles of new 14-inch outside diameter ("OD") natural gas loop pipeline within the cities of Medford and Somerville, Massachusetts. Since submission of this consultation, Algonquin has modified portions of the original J-2 Loop Project alignment.

The modified route will commence at an existing meter station located adjacent to the Mystic Valley Parkway in Medford. The Project will then continue south paralleling Interstate 93 to the corridor of Mystic Avenue. The alignment will then continue generally south and east within the Temple, Broadway, School, and Medford Street corridors to a terminus at an existing valve site located east of the McGrath Highway (Route 28) / Conrail overpass in Somerville. Please refer to the attached figure for a USGS topographic map depicting Algonquin's existing pipeline facilities as well as the modified J-2 Loop alignment.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- State designated wild or scenic rivers
- Lands administered by state agencies
- Any state-designated natural, recreational, scenic areas
- Any state-designated or administered natural landmarks or visually-sensitive areas

On behalf of Algonquin, ENSR requests that the Massachusetts Department of Conservation and Recreation conduct a preliminary review its records to identify whether the proposed pipeline will be located within or adjacent to any of the above-referenced areas and provide written comments relative to the identified resources. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
*Sr. Project Manager*

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

ENSR | AECOM

ENSR
[illegible] Massachusetts [illegible]
T 508.888.3900 F 508.888.[illegible] www.ensr.aecom.com

October 18, 2007

US EPA – Region 1
New England Office
Mr. Timothy Timmerman
1 Congress Street (CMA)
Boston, MA 02114-2023

Re: Sole Source Aquifer Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Timmerman:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

On behalf of Algonquin, ENSR requests that the EPA conduct a review of the proposed alignment and identify any existing or proposed Sole Source Aquifers crossed by or within 0.25 miles of the proposed route. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified.

Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
*Sr. Project Manager*

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

**Zimmer, John**

**From:** reiner.ed@epamail.epa.gov
**Sent:** Tuesday, October 23, 2007 1:25 PM
**To:** Zimmer, John
**Cc:** Hill.Michael@epamail.epa.gov; Timmermann.Timothy@epamail.epa.gov
**Subject:** October 18 letter to EPA Re: Sole Source Aquifer - J2 Loop Project

Dear Mr. Zimmer,

Your letter to EPA (Tim Timmermann), dated October 18, 2007 was routed to me for a response. I conferred with Michael Hill who would normally handle this inquiry, and can answer your question.

Using your Figure 1 as provided in your letter for the J-2 Loop Project and our web site information from the web site shown below, there is no existing Sole Source Aquifer crossed within 0.25 mile of the proposed two mile new 14-inch diameter pipeline from Medford to Sommerville, Massachusetts. There is also no proposed Sole Source Aquifer at this location.

http://www.epa.gov/region01/eco/drinkwater/pc_solesource_aquifer.html

Edward Reiner
Senior Wetland Scientist
USEPA
1 Congress St.
Suite 1100 (CWP)
Boston, MA 02114-2023

Ph. (617) 918-1692
Fx. (617) 918-0692
e. Reiner.Ed@epa.gov

ENSR | AECOM

ENSR
[illegible]
[illegible]

February 22, 2008

US EPA – Region 1
New England Office
Mr. Timothy Timmerman
1 Congress Street (CMA)
Boston, MA 02114-2023

Re: Sole Source Aquifer Information Request
J-2 Loop Project – Route Modifications
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Timmerman:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, consulted with the Environmental Protection Agency ("EPA") regarding the presence of existing or proposed Sole Source Aquifers crossed within 0.25 miles of the proposed J-2 Loop Project corridor in October of 2007. The J-2 Loop Project consists of the construction and installation of approximately two miles of new 14-inch outside diameter ("OD") natural gas loop pipeline within the cities of Medford and Somerville, Massachusetts. On October 23, 2007, EPA provided written consultation regarding the J-2 Project, and determined that there is no existing or proposed Sole Source Aquifer crossed within 0.25 miles of the proposed Project. Since receipt of this consultation, Algonquin has modified portions of the original J-2 Loop Project alignment.

The modified route will commence at an existing meter station located adjacent to the Mystic Valley Parkway in Medford. The Project will then continue south paralleling Interstate 93 to the corridor of Mystic Avenue. The alignment will then continue generally south and east within the Temple, Broadway, School, and Medford Street corridors to a terminus at an existing valve site located east of the McGrath Highway (Route 28) / Conrail overpass in Somerville. Please refer to the attached figure for a USGS topographic map depicting Algonquin's existing pipeline facilities as well as the modified J-2 Loop alignment.

On behalf of Algonquin, ENSR requests that the EPA conduct a review of the proposed alignment and identify any existing or proposed Sole Source Aquifers crossed by or within 0.25 miles of the modified route. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified.

Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
*Sr. Project Manager*

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

**Libby, Nicole**

**From:** Hill.Michael@epamail.epa.gov
**Sent:** Monday, March 31, 2008 3:55 PM
**To:** Libby, Nicole
**Cc:** reiner.ed@epamail.epa.gov; Timmermann.Timothy@epamail.epa.gov
**Subject:** Re: Information Request- J-2 Loop Project

**Attachments:** USEPA_2-22-08.PDF; Figure_1-1-1_J-2_Loop_Overview_topo.pdf

USEPA_2-22-08.PDF (52 KB) Figure_1-1-1_J-2_Loop_Overview...

Dear Ms. Libby:

A list and map of all sole source aquifers in New England can be found at the following link:
http://www.epa.gov/region1/eco/drinkwater/pc_solesource_aquifer.html

There are no sole source aquifers in the area of the "J-2 Loop Project" as indicated in your letter of February 22, 2008.

If you have any questions, please call me at (617) 918-1398.

Sincerely,

Michael Hill
EPA New England
(617) 918-1398

"Libby, Nicole" <nlibby@ensr.aecom.com>

03/31/2008 03:42 PM

To
Ed Reiner/R1/USEPA/US@EPA

cc
Michael Hill/R1/USEPA/US@EPA, Timothy Timmermann/R1/USEPA/US@EPA

Subject
Information Request- J-2 Loop Project

Mr. Reiner,

You had responded via email to an information request, dated October 18, 2007, in regards to The J-2 Loop Project in Medford and Somerville, MA. Your email response did not identify any sole source aquifers crossed by or within 0.25 miles of the proposed Project. The Project route has since been modified, and a second information request was sent to the attention of Mr. Timmermann on February 22, 2008. Attached is a copy of the February letter and the associated Project locus map. If you could review the modified locus map and provide any information in regards to sole source aquifers, it would be appreciated. The modification involves the Somerville portion of the route, which is now proposed to be located within the following road corridors: Mystic Avenue, Temple Street, Broadway, School Street and Medford Street.

Thank you for your time,

Nicole Libby
Project Specialist

ENSR
95 State Road
Sagamore Beach, MA 02562-2415
Office (508) 888-3900 ext. 228
Fax (508) 888-6689
Cell (508) 944-2102
(See attached file: USEPA_2-22-08.PDF)(See attached file: Figure_1-1-1_J-2_Loop_Overview_topo.pdf)

ENSR | AECOM

ENSR
[illegible]
[illegible]

October 18, 2007

NOAA Fisheries Service
Northeast Regional Office
Attn: Environmental Reviewer
30 Emerson Ave
Gloucester, MA 01930

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission LLC
Somerville and Medford MA

Dear Madame or Sir:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. On behalf of Algonquin, ENSR requests that the National Marine Fisheries Service conduct a preliminary review of the Project and identify any potential concerns associated with marine fisheries. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified.

Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecomcom. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

**Zimmer, John**

---

**From:** Evans, Tay (FWE) [Tay.Evans@state.ma.us]
**Sent:** Tuesday, October 23, 2007 9:32 AM
**To:** Zimmer, John
**Cc:** Chris Boelke
**Subject:** Algonquin J-Loop, Somerville and Medford

Dear John –

I recently received your letter request for review of the J-2 Loop project for Algonquin Gas Transmission, LLC in Medford and Somerville. The proposal is to modify a portion of existing pipeline with construction of approximately 2 miles of new 14-inch pipeline generally parallel to the existing system. The letter was addressed to NOAA Fisheries, but with the State's address. NOAA / NMFS is the federal fisheries management agency, and I am at the State Division of Marine Fisheries, part of Massachusetts Fish and Game. The person to contact at NOAA / NMFS is Chris Boelke (cced on this email).

From a preliminary review of the information provided, the Massachusetts Division of Marine Fisheries sees no fisheries resource concerns associated with the project at this time.

Thank you for contacting the Massachusetts Division of Marine Fisheries. If you have any further questions please call me at the number below.

Sincerely,

Tay

N. Tay Evans
Marine Fisheries Biologist
Massachusetts Division of Marine Fisheries
30 Emerson Avenue
Gloucester, MA 01930
phone: 978-282-0308 x168
fax: 617-727-3337

ENSR | AECOM

ENSR
[illegible]
[illegible]

February 22, 2008

National Marine Fisheries Service
Northeast Regional Office
Attn: Mr. David Tomey
One Blackburn Drive
Gloucester, MA 01930

Re: Information Request
J-2 Loop Project – Route Modifications
Algonquin Gas Transmission LLC
Somerville and Medford MA

Dear Madame or Sir:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, consulted with the National Marine Fisheries Service ("NMFS") regarding any potential concerns associated with marine fisheries within the proposed J-2 Loop Project corridor in October of 2007. The J-2 Loop Project consists of the construction and installation of approximately two miles of new 14-inch outside diameter ("OD") natural gas loop pipeline within the cities of Medford and Somerville, Massachusetts. On October 23, 2007, NMFS provided written consultation regarding the J-2 Project, and determined that from a preliminary review of the information provided, NMFS had no resource concerns associated with the project. Since receipt of this consultation, Algonquin has modified portions of the original J-2 Loop Project alignment.

The modified route will commence at an existing meter station located adjacent to the Mystic Valley Parkway in Medford. The Project will then continue south paralleling Interstate 93 to the corridor of Mystic Avenue. The alignment will then continue generally south and east within the Temple, Broadway, School, and Medford Street corridors to a terminus at an existing valve site located east of the McGrath Highway (Route 28) / Conrail overpass in Somerville. Please refer to the attached figure for a USGS topographic map depicting Algonquin's existing pipeline facilities as well as the modified J-2 Loop alignment.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. On behalf of Algonquin, ENSR requests that the National Marine Fisheries Service conduct a preliminary review of the Project and identify any potential concerns associated with marine fisheries. Enclosed is a USGS topographic locus map within the proposed location of the modified alignment identified.

Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecomcom. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

## Libby, Nicole

**From:** Evans, Tay (FWE) [Tay.Evans@state.ma.us]
**Sent:** Tuesday, April 01, 2008 2:05 PM
**To:** Libby, Nicole; christopher.boelke@noaa.gov
**Cc:** Evans, Tay (FWE)
**Subject:** RE: Fisheries Resources Information Request

Dear Nicole –

The Mystic River supports an important alewife population known to spawn in Lower Mystic Lake. The Massachusetts Division of Marine Fisheries recommends that no in water, silt producing work be conducted between April 1 to June 30 of any year to protect the passage and spawning of alewives and blueback herring. If you have any questions please call or email me at your convenience. Thank you.

Tay

N. Tay Evans
Marine Fisheries Biologist
Massachusetts Division of Marine Fisheries
30 Emerson Avenue
Gloucester, MA 01930
phone: 978-282-0308 x168
fax: 617-727-3337

-----Original Message-----
**From:** Libby, Nicole [mailto:nlibby@ensr.aecom.com]
**Sent:** Tuesday, April 01, 2008 1:19 PM
**To:** christopher.boelke@noaa.gov
**Cc:** Evans, Tay (FWE)
**Subject:** Fisheries Resources Information Request

Mr. Boelke,

This email is in regards to the J-2 Loop Project in Somerville and Medford, MA. Previous correspondence in October of 2007 with Tay Evans of the Massachusetts Division of Marine Fisheries had indicated no fisheries resource concerns associated with the J-2 Loop Project. The Project route has since been modified, and a second correspondence was sent to Mr. Tomey of your office on February 22, 2008. No response has been received on the Project modification to date. Would you be able to review the attached Project location map and indicate if there are any potential concerns with marine fisheries associated with the modified route? The Project involves construction of approximately 2 miles of new 14" diameter natural gas pipeline looping in Medford and Somerville, MA. The Project commences at an existing meter station adjacent to the Mystic Valley Parkway in Medford, and extends within Mystic Avenue, Temple Street, Broadway, School Street and Medford Street in Somerville. Any assistance you could provided in regards to marine resources would be appreciated.

Thank you for your time,

**Nicole Libby**
*Project Specialist*

**ENSR**
95 State Road
Sagamore Beach, MA 02562-2415
Office (508) 888-3900 ext. 228
Fax (508) 888-6689
Cell (508) 944-2102

## Libby, Nicole

**From:** Christopher.Boelke [Christopher.Boelke@Noaa.gov]
**Sent:** Tuesday, April 01, 2008 3:27 PM
**To:** Libby, Nicole
**Cc:** Evans, Tay (FWE)
**Subject:** Re: Fisheries Resources Information Request

**Attachments:** Christopher_Boelke.vcf

Christopher_Boelke
.vcf (434 B)...

Hi Nicole - NMFS would have the same issues and concerns that Tay has outlined below.

Thanks,
Chris

Evans, Tay (FWE) wrote:
>
> Dear Nicole -
>
> The Mystic River supports an important alewife population known to
> spawn in Lower Mystic Lake. The Massachusetts Division of Marine
> Fisheries recommends that no in water, silt producing work be
> conducted between April 1 to June 30 of any year to protect the
> passage and spawning of alewives and blueback herring. If you have any
> questions please call or email me at your convenience. Thank you.
>
> Tay
>
> N. Tay Evans
> Marine Fisheries Biologist
>
> Massachusetts Division of Marine Fisheries
> 30 Emerson Avenue
> Gloucester, MA 01930
>
> phone: 978-282-0308 x168
>
> fax: 617-727-3337
>
> -----Original Message-----
> *From:* Libby, Nicole [mailto:nlibby@ensr.aecom.com]
> *Sent:* Tuesday, April 01, 2008 1:19 PM
> *To:* christopher.boelke@noaa.gov
> *Cc:* Evans, Tay (FWE)
> *Subject:* Fisheries Resources Information Request
>
> Mr. Boelke,
>
> This email is in regards to the J-2 Loop Project in Somerville and
> Medford, MA. Previous correspondence in October of 2007 with Tay Evans
> of the Massachusetts Division of Marine Fisheries had indicated no
> fisheries resource concerns associated with the J-2 Loop Project. The
> Project route has since been modified, and a second correspondence was
> sent to Mr. Tomey of your office on February 22, 2008. No response has
> been received on the Project modification to date. Would you be able
> to review the attached Project location map and indicate if there are
> any potential concerns with marine fisheries associated with the
> modified route? The Project involves construction of approximately 2

> miles of new 14" diameter natural gas pipeline looping in Medford and Somerville, MA. The Project commences at an existing meter station adjacent to the Mystic Valley Parkway in Medford, and extends within Mystic Avenue, Temple Street, Broadway, School Street and Medford Street in Somerville. Any assistance you could provided in regards to marine resources would be appreciated.
>
> Thank you for your time,
>
> **Nicole Libby**
>
> //Project Specialist//
>
> **ENSR**
>
> 95 State Road
>
> Sagamore Beach, MA 02562-2415
>
> Office (508) 888-3900 ext. 228
>
> Fax (508) 888-6689
>
> Cell (508) 944-2102
>

ENSR | AECOM

ENSR
[illegible]
[illegible]

October 18, 2007

Natural Heritage and Endangered Species Program
Ms. Kristen Black
Massachusetts Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Ms.Black:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- have an adverse effect on threatened or endangered species or designated critical habitats
- jeopardize the continued existence of any proposed threatened or endangered species
- result in the destruction or adverse modification of proposed critical habitats

ENSR has reviewed the *MA Natural Heritage Atlas* (12th Ed.; Effective 10/1/2006) and determined that no portion of the project is located within any mapped Estimated or Priority Habitats or Certified Vernal Pools.

This request specifically addresses the requirement for documented consultation in regard to compliance with the Endangered Species Act of 1973 required under the FERC application process. We request consultation from your office regarding the occurrence of any threatened and/or endangered species (T&E) and/or their critical habitats, for the project areas depicted on the attached USGS topographic figures. Should you have any questions regarding this request, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

cc: William Brett – Algonquin

Attachments - USGS quadrangle locus map
Rare Species Information Form

# MESA Information Request Form

Please complete this form to request site-specific information from the Natural Heritage & Endangered Species Program (Please submit only one project per request form).

**Please include a check for $50.00 made out to the Natural Heritage & Endangered Species Fund.***

## Requestor Information

Name: John Zimmer

Affiliation: ENSR

Address: 95 State Road

City: Sagamore Beach State: MA Zip Code: 02562

Daytime Phone: (508)888-3900 Ext. 226

## Project Information

Project or Site Name: J-2 Loop Project

Location: McGrath Highway/Route 28, Broadway, Mystic Avenue/Route 38 Town: Medford and Sommerville

Name of Landowner or Project Proponent: Algonquin Gas Transmission, LLC

Acreage of the Property: Approximately 2 miles

Description of Proposed Project and Current Site Conditions: (If necessary attach additional sheet)
Please see attached letter

☐ Will this project be reviewed as a Notice of Intent by the local Conservation Commission? No
☐ Will this project be undergoing MEPA review for reasons other than rare species? No
☐ Have you enclosed the required copy of a USGS topographic map in the scale 1:24,000 or 1:25,000 (not copy reduced) with the site location clearly marked and centered on the copy page? (Copies of Natural Heritage Atlas pages are not accepted) Yes

Please **mail** this completed form and topographic map to:

Regulatory Review
Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
North Drive, Rte. 135
Westborough, MA 01581

Questions regarding this form should be directed to (508) 389-6380.

**Persons requesting information will receive a written response within 30 days of receipt of all information required.** Please do not ask for an expedited review. *If you are requesting information for habitat management or conservation purposes and you are a non-profit conservation group, government agency or working with a government agency please fill out a Data Release Form.

July 2005

*Commonwealth of Massachusetts*

**Division of Fisheries & Wildlife**

***MassWildlife***

Wayne F. MacCallum, *Director*

11/12/2007

John Zimmer
ENSR
95 State Road
Sagamore Beach MA 02562

RE: Project Location: McGrath Highway/Route 28, Broadway, Mystic Avenue/Route 38
Town: MEDFORD, SOMERVILLE
**NHESP Tracking No.: 07-23534**

To Whom It May Concern:

Thank you for contacting the Natural Heritage and Endangered Species Program ("NHESP") of the MA Division of Fisheries & Wildlife for information regarding state-listed rare species in the vicinity of the above referenced site.

Based on the information provided, the NHESP has determined that at this time the site is not mapped as Priority or Estimated Habitat and the NHESP does not have any rare species concerns associated with this site.

This evaluation is based on the most recent information available in the NHESP database, which is constantly being expanded and updated through ongoing research and inventory. If you have any questions regarding this letter please contact Emily Holt, Endangered Species Review Assistant, at (508) 389-6361.

Sincerely,

Thomas W. French, Ph.D.
Assistant Director

*www.masswildlife.org*

Division of Fisheries and Wildlife
Field Headquarters, North Drive, Westborough, MA 01581 (508) 389-6300 Fax (508) 389-7891
*An Agency of the Department of Fish and Game*

ENSR | AECOM

ENSR
95 State Road, Sagamore Beach, Massachusetts 02562-[illegible]
T 508.888.3900 F 508.888.6689 www.ensr.aecom.com

February 21, 2008

Natural Heritage and Endangered Species Program
Ms. Kristen Black
Massachusetts Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581

Re: Information Request
NHESP Tracking Number 07-23534
J-2 Loop Project – Route Modifications
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Ms.Black:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, consulted with the Natural Heritage and Endangered Species Program ("NHESP") regarding the occurrence of threatened and/or endangered species (T&E) and/or critical habitats potentially occurring within the proposed J-2 Loop Project corridor in October of 2007. The J-2 Loop Project consists of the construction and installation of approximately two miles of new 14-inch outside diameter ("OD") natural gas loop pipeline within the cities of Medford and Somerville, Massachusetts. On November 12, 2007, NHESP provided written consultation (NHESP Tracking Number 07-23534) regarding the J-2 Project, and determined that no portion of the project area was within mapped Priority or Estimated Habitat and NHESP had no rare species concerns with the proposed Project. Since receipt of this consultation, Algonquin has modified portions of the original J-2 Loop Project alignment.

The modified route will commence at an existing meter station located adjacent to the Mystic Valley Parkway in Medford. The Project will then continue south paralleling Interstate 93 to the corridor of Mystic Avenue. The alignment will then continue generally south and east within the Temple, Broadway, School, and Medford Street corridors to a terminus at an existing valve site located east of the McGrath Highway (Route 28) / Conrail overpass in Somerville. Please refer to the attached figure for a USGS topographic map depicting Algonquin's existing pipeline facilities as well as the modified J-2 Loop alignment.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- have an adverse effect on threatened or endangered species or designated critical habitats
- jeopardize the continued existence of any proposed threatened or endangered species
- result in the destruction or adverse modification of proposed critical habitats

ENSR has reviewed the *MA Natural Heritage Atlas* (12th Ed.; Effective 10/1/2006) and determined that no portion of the modified route is located within any mapped Estimated or Priority Habitats or Certified Vernal Pools.

This request specifically addresses the requirement for documented consultation in regard to compliance with the Endangered Species Act of 1973 required under the FERC application process. We request consultation from your office regarding the occurrence of any threatened and/or endangered species (T&E) and/or their critical habitats, for the project areas depicted on the attached USGS topographic figures. Should you have any questions regarding this request, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

for

John Zimmer
Sr. Project Manager

cc: William Brett – Algonquin

Attachments - USGS quadrangle locus map
Rare Species Information Form

MassWildlife

*Commonwealth of Massachusetts*

**Division of Fisheries & Wildlife**

Wayne F. MacCallum, *Director*

3/17/2008

John Zimmer
ENSR
95 State Road
Sagamore Beach MA 02562

RE: Project Location: J-2 Loop Project – Route Modifications
Town: MEDFORD, SOMERVILLE
**NHESP Tracking No.: 07-23534**

To Whom It May Concern:

Thank you for contacting the Natural Heritage and Endangered Species Program ("NHESP") of the MA Division of Fisheries & Wildlife for information regarding state-listed rare species in the vicinity of the above referenced site.

Based on the information provided, the NHESP has determined that at this time the site is not mapped as Priority or Estimated Habitat and the NHESP database does not contain any state-listed species records in the immediate vicinity of this site.

This evaluation is based on the most recent information available in the NHESP database, which is constantly being expanded and updated through ongoing research and inventory. If you have any questions regarding this letter please contact Emily Holt, Endangered Species Review Assistant, at (508) 389-6361.

Sincerely,

Thomas W. French

Thomas W. French, Ph.D.
Assistant Director

*www.masswildlife.org*

Division of Fisheries and Wildlife
Field Headquarters, North Drive, Westborough, MA 01581 (508) 389-6300 Fax (508) 389-7891
*An Agency of the Department of Fish and Game*

ENSR | AECOM

ENSR
[illegible]
[illegible]

October 18, 2007

U. S. National Park Service
Mr. David Clark – Environmental Protection Program Manager
15 State Street
Boston, MA 02109

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Clark:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- Lands administered by federal agencies
- Federal natural, recreational or scenic areas
- Natural landmarks and visually-sensitive areas

On behalf of Algonquin, ENSR requests that the U. S. National Park Service review its records to identify whether the proposed alignment will directly cross or be located within 0.25 miles of any of the above-referenced areas and provide written comments relative to the identified resources. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-

3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

ENSR | AECOM

ENSR
[illegible]
[illegible]

February 22, 2008

U. S. National Park Service
Mr. David Clark – Environmental Protection Program Manager
15 State Street
Boston, MA 02109

Re: Information Request
J-2 Loop Project – Route Modifications
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Clark:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, consulted with the U.S. National Park Service regarding the occurrence of sensitive environmental areas potentially occurring within the proposed J-2 Loop Project corridor in October of 2007. The J-2 Loop Project consists of the construction and installation of approximately two miles of new 14-inch outside diameter ("OD") natural gas loop pipeline within the cities of Medford and Somerville, Massachusetts. Since submission of this consultation, Algonquin has modified portions of the original J-2 Loop Project alignment.

The modified route will commence at an existing meter station located adjacent to the Mystic Valley Parkway in Medford. The Project will then continue south paralleling Interstate 93 to the corridor of Mystic Avenue. The alignment will then continue generally south and east within the Temple, Broadway, School, and Medford Street corridors to a terminus at an existing valve site located east of the McGrath Highway (Route 28) / Conrail overpass in Somerville. Please refer to the attached figure for a USGS topographic map depicting Algonquin's existing pipeline facilities as well as the modified J-2 Loop alignment.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- Lands administered by federal agencies
- Federal natural, recreational or scenic areas
- Natural landmarks and visually-sensitive areas

On behalf of Algonquin, ENSR requests that the U. S. National Park Service review its records to identify whether the proposed modified alignment will directly cross or be located within 0.25 miles of any of the above-referenced areas and provide written comments relative to the identified resources. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-

3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

ENSR | AECOM

ENSR
[illegible]
[illegible]

October 18, 2007

Massachusetts Office of Coastal Zone Management
Attn: Mr. Truman Henson
251 Causeway Street, Suite 800
Boston, MA 02114

Re: Jurisdictional Determination Concurrence Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Henson:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and the National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. Review of the Coastal Boundary (as defined in 301 CMR 21.99) do not identify the project area as being within the Coastal Boundary. As part of the FERC NEPA review, it is necessary to identify whether the project is within the jurisdiction of the Massachusetts Office of Coastal Zone Management ("CZM") subsequently requiring Federal Consistency Review under the Coastal Zone Management Act.

On behalf of Algonquin, ENSR requests that the Massachusetts of Coastal Zone Management provide a written concurrence with the above findings that the project location is outside of the Coastal Boundary and further provide a written determination regarding CZM's jurisdiction relative to the proposed project. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett -- Algonquin

Attachment - USGS quadrangle locus map

**THE COMMONWEALTH OF MASSACHUSETTS**
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX- (617) 626-1240

October 29, 2007

Mr. John Zimmer
Senior Project Manager
ENSR
95 State Road
Sagamore Beach, MA 02562-2415

RE: J-2 Loop Project, Algonquin Gas Transmission, LLC; Somerville and Medford.

Dear Mr. Zimmer:

The Massachusetts Office of Coastal Zone Management (CZM) has received your package of information, including plans, for the proposed expansion of the interstate natural gas pipeline from Medford to Somerville.

The activities associated with this project fall outside the geographical boundaries of the Massachusetts Coastal Zone as delineated in Chapter 5: Massachusetts Coastal Regions and An Atlas of Resources, 1 June 1977 and further described in the Massachusetts Coastal Zone Management Plan and therefore are not subject to federal consistency review by this office.

Thank you for submitting the information to CZM. If you have any questions regarding our review process, feel free to call me at (617) 626-1050.

Sincerely,

Robert L. Boeri

Robert L. Boeri
Acting Project Review Coordinator

cc: Karen Kirk Adams, Chief
Regulatory Branch, NED, US Army Corps of Engineers

**DEVAL L. PATRICK** GOVERNOR **TIMOTHY P. MURRAY** LIEUTENANT GOVERNOR **IAN A. BOWLES** SECRETARY **BRUCE K. CARLISLE** ACTING DIRECTOR
www.mass.gov/czm

ENSR | AECOM

ENSR
[illegible]
[illegible]

February 22. 2008

Massachusetts Office of Coastal Zone Management
Attn: Mr. Truman Henson
251 Causeway Street, Suite 800
Boston, MA 02114

Re: Jurisdictional Determination Concurrence Request
J-2 Loop Project – Route Modifications
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Henson:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, consulted with the Massachusetts Office of Coastal Zone Management ("CZM") to identify whether the proposed J-2 Loop Project corridor is within the jurisdiction of the CZM in October of 2007. The J-2 Loop Project consists of the construction and installation of approximately two miles of new 14-inch outside diameter ("OD") natural gas loop pipeline within the cities of Medford and Somerville, Massachusetts. On October 29, 2007, CZM provided written consultation regarding the J-2 Project, and determined that all activities associated with the project fall outside the geographical boundaries of the Massachusetts Coastal Zone and therefore are not subject to Federal Consistency Review. Since receipt of this consultation, Algonquin has modified portions of the original J-2 Loop Project alignment.

The modified route will commence at an existing meter station located adjacent to the Mystic Valley Parkway in Medford. The Project will then continue south paralleling Interstate 93 to the corridor of Mystic Avenue. The alignment will then continue generally south and east within the Temple, Broadway, School, and Medford Street corridors to a terminus at an existing valve site located east of the McGrath Highway (Route 28) / Conrail overpass in Somerville. Please refer to the attached figure for a USGS topographic map depicting Algonquin's existing pipeline facilities as well as the modified J-2 Loop alignment.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and the National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. Review of the Coastal Boundary (as defined in 301 CMR 21.99) do not identify the project area as being within the Coastal Boundary. As part of the FERC NEPA review, it is necessary to identify whether the project is within the jurisdiction of the Massachusetts Office of Coastal Zone Management ("CZM") subsequently requiring Federal Consistency Review under the Coastal Zone Management Act.

On behalf of Algonquin, ENSR requests that the Massachusetts Office of Coastal Zone Management provide a written concurrence with the above findings that the project location is outside of the Coastal Boundary and further provide a written determination regarding CZM's jurisdiction relative to the proposed project. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

**THE COMMONWEALTH OF MASSACHUSETTS**
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

March 10, 2008

Mr. John Zimmer
Senior Project Manager
ENSR
95 State Road
Sagamore Beach, MA 02562-2415

RE: J-2 Loop Project – Route Modifications, Algonquin Gas Transmission, LLC;
Somerville and Medford

Dear Mr. Zimmer:

The Massachusetts Office of Coastal Zone Management (CZM) has received your package of information, including plans, for the proposed rerouting of the J-2 Loop natural gas pipeline in Somerville and Medford.

The activities associated with this project fall outside the geographical boundaries of the Massachusetts Coastal Zone as delineated in Chapter 5: Massachusetts Coastal Regions and An Atlas of Resources, 1 June 1977 and further described in the Massachusetts Coastal Zone Management Plan and therefore are not subject to federal consistency review by this office.

Thank you for submitting the information to CZM. If you have any questions regarding our review process, feel free to call me at (617) 626-1050.

Sincerely,

Robert L. Boeri

Robert L. Boeri
Project Review Coordinator

cc: Karen Kirk Adams, Chief
Regulatory Branch, NED, US Army Corps of Engineers

DEVAL L. PATRICK GOVERNOR TIMOTHY P. MURRAY LIEUTENANT GOVERNOR IAN A. BOWLES SECRETARY LESLIE-ANN S. McGEE DIRECTOR
www.mass.gov/czm

ENSR | AECOM

ENSR

October 18, 2007

Massachusetts DEP Northeast Region
Remedial Monitoring – Bureau of Waste Site Cleanup
Attn: Mr. Steven Johnson
205B Lowell Street
Wilmington, Massachusetts 01887

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Johnson:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- known instances of any hazardous materials spills;
- sites known to be contaminated with hazardous materials; and
- sites with on-going environmental remediation activities

On behalf of Algonquin, ENSR requests that the Bureau of Waste Site Cleanup conduct a review of the proposed alignment and identify any of the above mentioned areas crossed by or within 0.25 miles of the proposed route. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

**Zimmer, John**

---

**From:** Johnson, Stephen (DEP) [Stephen.Johnson@state.ma.us]
**Sent:** Tuesday, October 23, 2007 3:23 PM
**To:** Zimmer, John
**Subject:** Algonquin Gas line, Somerville & Medford

Mr. Zimmer,

I received your October 18, 2007 letter regarding the proposed Algonquin Gas pipeline in Somerville and Medford. Your letter indicated your interest in identifying known spills of hazardous materials, sites with known contamination, and sites with on-going environmental remediation activities within .25 miles of the proposed pipeline.

MassDEP is not able to conduct the research necessary to provide this information to you. However, we make our Waste Site Cleanup files available to companies such as yours so that you can do the research you want to have performed. To make an appointment to review our files, please contact Holly Migliacci at 978-694-3320. You may also conduct some research of waste sites on-line at http://db.state.ma.us/dep/cleanup/sites/search.asp.

Steve Johnson
MassDEP, Northeast Regional Office

ENSR | AECOM

ENSR
[illegible]
[illegible]

February 22, 2008

Massachusetts DEP Northeast Region
Remedial Monitoring – Bureau of Waste Site Cleanup
Attn: Mr. Steven Johnson
205B Lowell Street
Wilmington, Massachusetts 01887

Re: Information Request
J-2 Loop Project – Route Modifications
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Johnson:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, consulted with the Massachusetts Department of Environmental Protection, Northeast Regional Office ("MassDEP") regarding the occurrence of any hazardous materials spills, sites known to be contaminated with hazardous materials, or sites with on-going environmental remediation activities occurring within the proposed J-2 Loop Project corridor in October of 2007. The J-2 Loop Project consists of the construction and installation of approximately two miles of new 14-inch outside diameter ("OD") natural gas loop pipeline within the cities of Medford and Somerville, Massachusetts. On October 23, 2007, MassDEP provided written consultation regarding the J-2 Project, and provided instructions for obtaining records for known sensitive environmental areas within the proposed Project corridor. Since receipt of this consultation, Algonquin has modified portions of the original J-2 Loop Project alignment.

The modified route will commence at an existing meter station located adjacent to the Mystic Valley Parkway in Medford. The Project will then continue south paralleling Interstate 93 to the corridor of Mystic Avenue. The alignment will then continue generally south and east within the Temple, Broadway, School, and Medford Street corridors to a terminus at an existing valve site located east of the McGrath Highway (Route 28) / Conrail overpass in Somerville. Please refer to the attached figure for a USGS topographic map depicting Algonquin's existing pipeline facilities as well as the modified J-2 Loop alignment.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- known instances of any hazardous materials spills;
- sites known to be contaminated with hazardous materials; and
- sites with on-going environmental remediation activities

On behalf of Algonquin, ENSR requests that the Bureau of Waste Site Cleanup conduct a review of the proposed modified alignment and identify any of the above mentioned areas crossed by or within 0.25 miles of the proposed route. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

cc: William Brett – Algonquin

Attachments - USGS quadrangle locus map

## Zimmer, John

**From:** Johnson, Stephen (DEP) [Stephen.Johnson@state.ma.us]
**Sent:** Thursday, February 28, 2008 2:14 PM
**To:** Zimmer, John
**Subject:** Algonquin Gas project

Mr. Zimmer,

MassDEP has received your February 22, 2008 letter requesting information about spills of hazardous materials, sites contaminated with hazardous materials, and sites with on-going remedial activities within 0.25 miles of the proposed Algonquin Gas J-2 Loop project. MassDEP does not have a list that is specific to your request, nor can we spare the staff resources to conduct the research necessary to come up with such a list. However, our files are accessible to the public. Please feel free to contact Holly Migliacci at 978-694-3320 to arrange for an appointment to review MassDEP's files in Wilmington. Alternatively, some of the information you seek may be able to be found on-line using MassDEP's web site at http://www.mass.gov/dep/cleanup/sites/sdown.htm .

Steve Johnson
MassDEP
Bureau of Waste Site Cleanup

ENSR | AECOM

ENSR
[illegible]
[illegible]

October 18, 2007

Massachusetts Executive Office of Environmental Affairs
Office of the State Geologist
Stephen B. Mabee, State Geologist
University of Massachusetts – Geosciences Department
611 North Pleasant Street
Amherst, MA 01003-9297

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Mabee:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- The presence or potential for paleontological resources;
- Earthquake hazard;
- The presence of any active or currently dormant faults;
- Areas susceptible to soil liquefaction;
- Areas susceptible to landsliding, slumping, or ground subsidence due to karst terrain or underground mining;
- Areas susceptible to flash flooding; and
- Areas susceptible to volcanism.

On behalf of Algonquin, ENSR requests that the Office of the State Geologist conduct a review of the proposed alignment and identify any of the above mentioned hazards or resources crossed by or within 0.25 miles of the proposed route, including any of the above reference resources. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

Office of the State Geologist
Department of Geosciences
University of Massachusetts
611 North Pleasant Street
Amherst, MA 01003

Stephen B. Mabee
Phone: 413.545.4814
Fax: 413.545.1200
E-mail: sbmabee@geo.umass.edu

---

November 1, 2007

Mr. John Zimmer
ENSR AECOM
95 State Road
Sagamore Beach, MA 02562-2415

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Zimmer:

I have completed the review of the proposed 2-mile long gas line project for the FERC NEPA evaluation process. The following provides a summary of the findings concerning the geological issues you have raised. This summary is based on a cursory evaluation of the information available at this time.

Bedrock geology -- The entire pipeline will pass through what is mapped as argillite on Kaye's 1980 Miscellaneous Field Studies Map 1241 of the Boston basin. This is a mildly metamorphosed shale. The age is purported to be preCambrian. The attached figure shows the geology as derived from Kaye (1980). If you want a jpg of this map, notify me and I will place the map on a server where you can download it.

Surficial Geology -- The pipeline passes primarily through fine-grained deposits and glacial till. The fine-grained deposits are most likely Boston Blue Clay and may be quite sensitive to vibration. The attached figure shows the general surficial geology. Brown is glacial till (oldest and probably underlies everything), purple is fine-grained deposits; this is most likely blue clay (probably also underlies the sand and gravel deposits), orange is sand and gravel and yellow is modern alluvium (youngest deposit). This map is based on data available from MassGIS.

Paleontological resources -- I have no knowledge of the existence of paleontological resources at the proposed site. You will have to contact Harvard University or others for this information.

Presence of any active or currently dormant faults – Kaye (1980) shows several faults crossing the layout of the proposed pipeline. The attached map shows the position of these faults in your area.

Areas susceptible to soil liquefaction -- The blue clay (fine-grained deposits) is susceptible to soil liquefaction under the right conditions.

Areas susceptible to landsliding, slumping or ground subsidence -- There are no karst or mining activities that would pose a ground subsidence hazard. However, slumping and sloughing of excavations in the blue clay is expected. Excavations in till might also produce some minor slumping depending on water content particularly during heavy rains or lengthy wet periods. Good housekeeping during construction should alleviate this potential issue.

Areas susceptible to flash flooding -- Although flooding can occur in periods of heavy rain, flash flooding is not an issue.

Volcanism -- No volcanism in Massachusetts.

For more information on earthquake hazards, I recommend you contact Dr. John Ebel at Weston Observatory. They have a better handle on seismicity in Massachusetts.

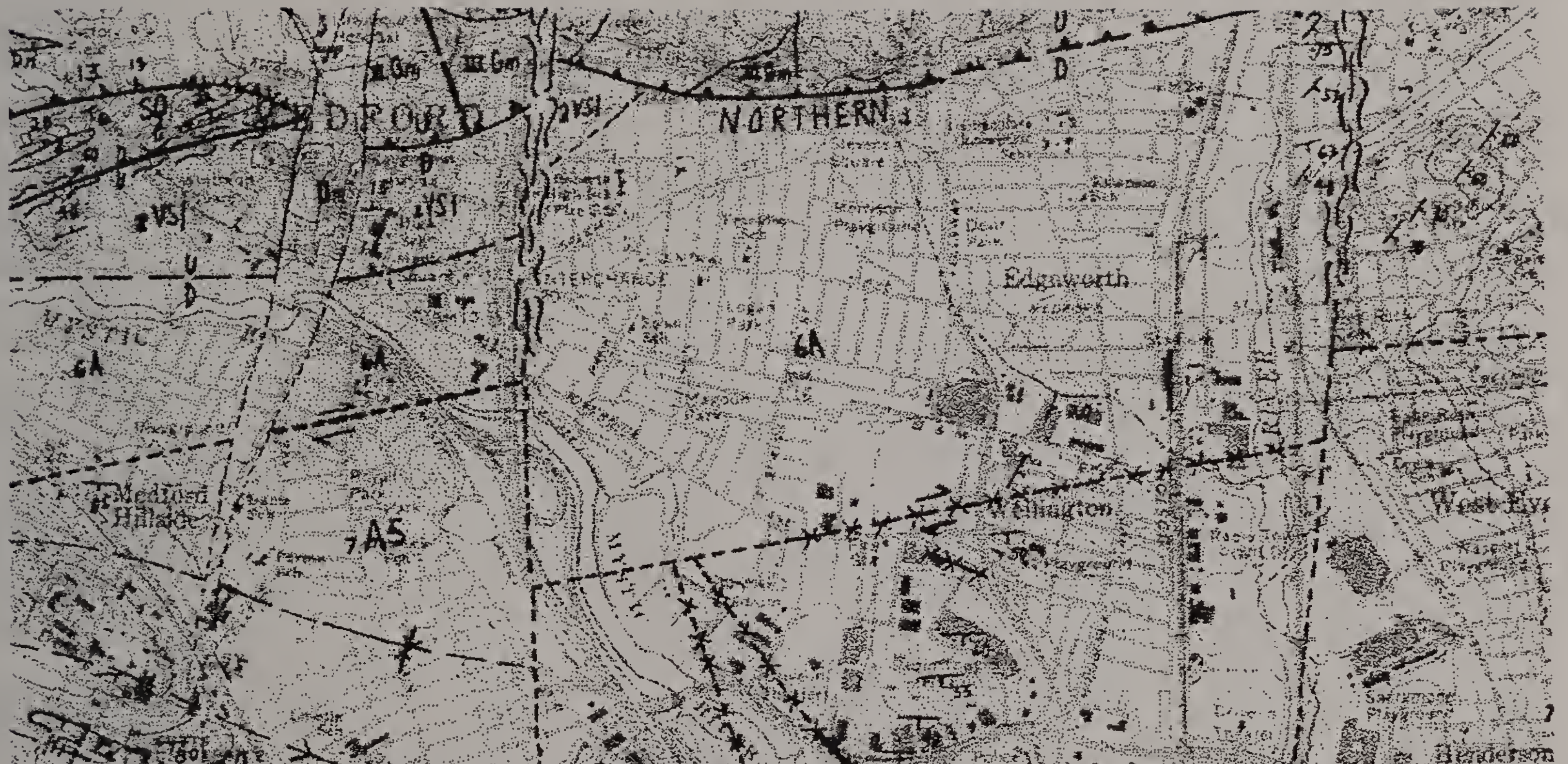
Weston Observatory
Boston College Department of Geology and Geophysics
381 Concord Road
Weston, MA 02493-1340
tel 617-552-8300
John.ebel.1@bc.edu.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Stephen B. Mabee

Stephen B. Mabee, Ph.D., PG
State Geologist


NORTHERN
MEDFORD
Edgworth
Wellington
West Ev
Henderson
Medford Hillside
MYSTIC
MYSTIC RIVER
MALDEN
RESERVATION
Ten Hills
Winter Hill
Spring Hill
SOMERVILLE
East Somerville
Prospect Hill
CAMBRIDGE
Charlestown
MIDDLESEX
SUFFOLK
6A
7AS
7AS
7AS
TSQ
SQ
Dm
VSI
Gm
U
D

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

## EXPLANATION

Contact—Solid where known; long dashed where approximately located; short dashed where inferred

Gradational and highly irregular contacts—[illegible]

Fault—Solid where known; long dashed where approximately located; short dashed where inferred; dotted where beneath water. U and D indicate relative upthrown and downthrown sides; [illegible] fault surface

Fault zone—[illegible]

Thrust fault—Teeth on upper plate. Solid where known; dashed where approximately located

Fault [illegible] approximately located

Anticlinal axis—Dashed where approximately located. Arrow shows direction of plunge

Synclinal axis—Dashed where approximately located. Arrow shows direction of plunge

Planar features

Strike and dip of bedding in sedimentary rocks and flow banding in volcanic rocks

Inclined

Vertical

Horizontal

Overturned

Average strike and dip of folded beds

Strike and dip of foliation

Strike and dip of cleavage

Dip of [illegible]

[illegible]

[illegible]

[illegible]

Location of sample radiometric age determination

Note: [illegible]

## RELATIVE AND GEOLOGIC AGES AS USED ON THIS MAP

[illegible]

[illegible]

Table 1.—Radiometric ages from [illegible]

| Sample location | [illegible] | Radiometric age (millions of years) | Geologic age | Reference (see below) |
|---|---|---|---|---|
| [illegible] | [illegible] | [illegible] | [illegible] | (a) |
| [illegible] | [illegible] | [illegible] | Proterozoic Z | (b) |
| [illegible] | [illegible] | [illegible] | [illegible] | (c) |

(a) [illegible]

(b) [illegible]

(c) [illegible]

## DESCRIPTION OF MAP UNITS

[illegible]

Example

[illegible]

### SEDIMENTARY ROCKS

[illegible]

**A** [illegible]

**Ss** [illegible]

[illegible]

### IGNEOUS ROCKS

[illegible]

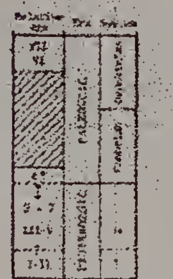


Figure 1.—Geologic ages

**Bx** [illegible]

VOLCANIC ROCKS [illegible]

**Vr** RHYOLITE AND RHYODACITE [illegible]

[illegible]

[illegible]

[illegible]

**Vb** [illegible]

[illegible]

PLUTONIC ROCKS [illegible]

[illegible]

**Gs** [illegible]

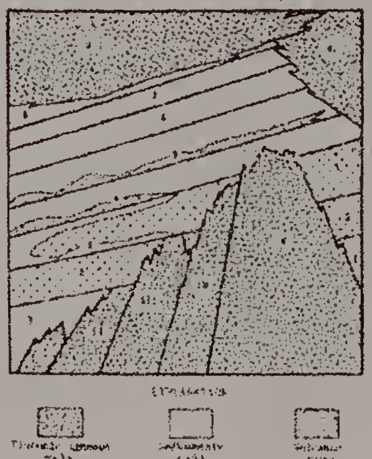


Figure 2.—[illegible]

[illegible]

[illegible]

## REFERENCES CITED

Bell, K. G., and Alvord, D. C., 1976, Pre-Silurian stratigraphy of northeastern Massachusetts, *in* Page, L. R., ed., Contributions to the stratigraphy of New England: Geological Society of America Memoir 148, p. [illegible].

Billings, M. P., [illegible], Geology of the Boston basin, *in* [illegible], Studies in New England geology: Geological Society of America Memoir [illegible].

Clapp, C. H., [illegible], Geology of the igneous rocks of Essex County, Massachusetts: U.S. Geological Survey Bulletin [illegible].

Crosby, W. O., [illegible], Contributions to the geology of eastern Massachusetts: Boston Society of Natural History Occasional Paper [illegible].

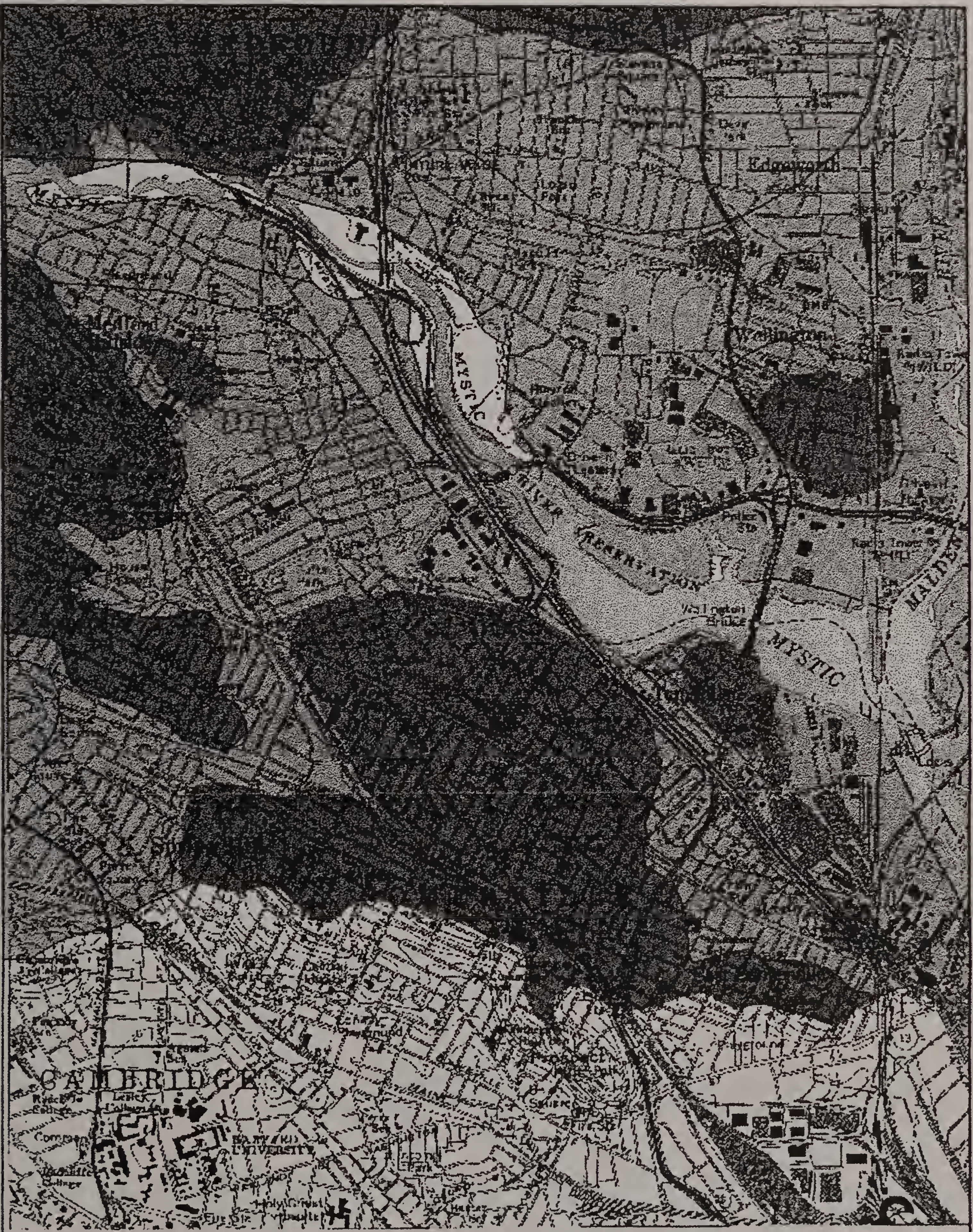
Emerson, B. K., [illegible], Geology of Massachusetts and Rhode Island: U.S. Geological Survey Bulletin [illegible].

LaForge, Laurence, [illegible], Geology of the Boston area, Massachusetts: U.S. Geological Survey Bulletin [illegible].

[illegible]

[illegible] U.S. Geological Survey usage

[illegible]


Edgeworth
MYSTIC
Wellington
RIVER
RESERVATION
MYSTIC
MALDEN
CAMBRIDGE
HARVARD UNIVERSITY

ENSR | AECOM

ENSR
[illegible]
[illegible]

February 22, 2008

Massachusetts Executive Office of Environmental Affairs
Office of the State Geologist
Stephen B. Mabee, State Geologist
University of Massachusetts – Geosciences Department
611 North Pleasant Street
Amherst, MA 01003-9297

Re: Information Request
J-2 Loop Project – Route Modifications
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Mabee:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, consulted with the Massachusetts Executive Office of Environmental Affairs, Office of the State Geologist regarding the occurrence of geological issues potentially occurring within the proposed J-2 Loop Project corridor in October of 2007. The J-2 Loop Project consists of the construction and installation of approximately two miles of new 14-inch outside diameter ("OD") natural gas loop pipeline within the cities of Medford and Somerville, Massachusetts. On November 1, 2007, the Office of the State Geologist provided written consultation regarding the J-2 Project, and identified the geologic issues within the proposed J-2 Loop Project corridor. Since receipt of this consultation, Algonquin has modified portions of the original J-2 Loop Project alignment.

The modified route will commence at an existing meter station located adjacent to the Mystic Valley Parkway in Medford. The Project will then continue south paralleling Interstate 93 to the corridor of Mystic Avenue. The alignment will then continue generally south and east within the Temple, Broadway, School, and Medford Street corridors to a terminus at an existing valve site located east of the McGrath Highway (Route 28) / Conrail overpass in Somerville. Please refer to the attached figure for a USGS topographic map depicting Algonquin's existing pipeline facilities as well as the modified J-2 Loop alignment.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- The presence or potential for paleontological resources;
- Earthquake hazard;
- The presence of any active or currently dormant faults;
- Areas susceptible to soil liquefaction;

On behalf of Algonquin, ENSR requests that the Office of the State Geologist conduct a review of the modified alignment and identify any of the above mentioned hazards or resources crossed by or within 0.25 miles of the proposed route, including any of the above reference resources. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

ENSR | AECOM

ENSR
[illegible]
[illegible]

October 18, 2007

Massachusetts Water Resources Authority
Jeff McLaughlin - Region 1 Community Relations Coordinator
Charlestown Navy Yard
100 First Avenue, Building 39
Charlestown, MA 02129

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. McLaughlin:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- Water supply systems

On behalf of Algonquin, ENSR requests that the Massachusetts Water Resources Authority conduct a review of the proposed alignment and identify any drinking water resources crossed by or within 0.25 miles of the proposed route, including any of the above reference resources. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x 226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

ENSR | AECOM

ENSR
[illegible]
[illegible]

February 22. 2008

Massachusetts Water Resources Authority
Jeff McLaughlin - Region 1 Community Relations Coordinator
Charlestown Navy Yard
100 First Avenue, Building 39
Charlestown, MA 02129

Re: Information Request
J-2 Loop Project – Route Modification
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. McLaughlin:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, consulted with the Massachusetts Water Resource Authority regarding the occurrence of any drinking water resources potentially occurring within the proposed J-2 Loop Project corridor in October of 2007. The J-2 Loop Project consists of the construction and installation of approximately two miles of new 14-inch outside diameter ("OD") natural gas loop pipeline within the cities of Medford and Somerville, Massachusetts. Since submission of this consultation, Algonquin has modified portions of the original J-2 Loop Project alignment.

The modified route will commence at an existing meter station located adjacent to the Mystic Valley Parkway in Medford. The Project will then continue south paralleling Interstate 93 to the corridor of Mystic Avenue. The alignment will then continue generally south and east within the Temple, Broadway, School, and Medford Street corridors to a terminus at an existing valve site located east of the McGrath Highway (Route 28) / Conrail overpass in Somerville. Please refer to the attached figure for a USGS topographic map depicting Algonquin's existing pipeline facilities as well as the modified J-2 Loop alignment.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- Water supply systems

On behalf of Algonquin, ENSR requests that the Massachusetts Water Resources Authority conduct a review of the proposed modified alignment and identify any drinking water resources crossed by or within 0.25 miles of the proposed route, including any of the above reference resources. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-

3900 x 226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

**Libby, Nicole**

---

**From:** Libby, Nicole
**Sent:** Tuesday, April 01, 2008 12:53 PM
**To:** 'stephen.estes-smargiassi@mwra.state.ma.us'
**Subject:** Water Supply Systems Information Request
**Attachments:** Figure_1-1-1_J-2_Loop_Overview_topo.pdf

Stephen,

I spoke with Jeff McLaughlin of MWRA this morning and he suggested I contact you in regards to the following information request:

Algonquin Gas Transmission, LLC is proposing to construct approximately 2 miles of 14-inch natural gas pipeline looping in Medford and Somerville, MA (J-2 Loop Project). The Project will be located within existing roadway corridors and paved parking lots, commencing at an existing meter station adjacent to the Mystic Valley Parkway in Medford and extending within Mystic Avenue, Temple Street, Broadway, School Street and Medford Street in Somerville. As part of the FERC/NEPA review process, we are requesting information on the presence of any municipal designated aquifers, surface waters that provide drinking water supplies, municipal designated surface water protection areas, and any known existing or proposed public or private drinking water wells or springs within 300 feet of the proposed alignment. Attached is a Project location map. If you could review the attached map and provide information relative to any public water resources crossed by or within 1/4 mile of the proposed Project, it would be greatly appreciated. Please feel free to contact me at the number below with any questions in regards to this request.

Thank you for your time,

**Nicole Libby**
*Project Specialist*

**ENSR**
95 State Road
Sagamore Beach, MA 02562-2415
Office (508) 888-3900 ext. 228
Fax (508) 888-6689
Cell (508) 944-2102

ENSR | AECOM

ENSR
[illegible]
[illegible]

October 18, 2007

City of Medford Department of Planning and Community Development
Lauren DiLorenzo - Director
85 George P. Hassett Drive
Medford, MA 02155

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. DiLorenzo:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- Planned residential subdivision developments within 0.25 miles
- Planned commercial or industrial developments within 0.25 miles

On behalf of Algonquin, ENSR requests that the City of Medford Department of Planning and Community Development conduct a preliminary review of the proposed alignment and identify any planned residential subdivisions or commercial/industrial developments crossed by or within 0.25 miles of the proposed route. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x 226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

# City of Medford

OFFICE OF COMMUNITY DEVELOPMENT

City Hall - Room 308
85 George P. Hassett Drive
Medford, Massachusetts 02155

LAUREN DILORENZO
*Director*

Telephone
(781) 393-2480
FAX: (781) 393-2342
TDD: (781) 393-2516

John Zimmer, Project Manager
ENSR
95 State Road
Sagamore Beach, MA 02562

Dear Mr. Zimmer:

With all due respect it is not the responsibility of this office to identify the information you have requested. You are the consultant and you should be obtaining this information. If would like to meet with me to have a discussion about projects I know of, please call me. You should be prepared to show me the exact locations within a .25 mile of the project along its full length in Medford, in order for me to know the potential areas impacted. You should also contact the Building Department.

Very truly yours,

Lauren DiLorenzo
Director

LD:pw

**Libby, Nicole**

---

**From:** Paul Mochi [pmochi@medford.org]
**Sent:** Wednesday, April 02, 2008 5:07 PM
**To:** Libby, Nicole
**Subject:** RE: Information Request

Hi Nicole - the only project we have in this area is at 275 mystic avenue, which is a commercial building. Give me a call if you have any other questions....Paul

---

**From:** Libby, Nicole [mailto:nlibby@ensr.aecom.com]
**Sent:** Tuesday, April 01, 2008 11:05 AM
**To:** Paul Mochi
**Subject:** Information Request

Mr. Mochi,

I had previously corresponded with Lauren DiLorenzo of the Medford Office of Community Development involving an information request on planned developments. Ms. DiLorenzo suggested that I also contact the Medford Building Department in regards to the following request. The project involves a natural gas pipeline loop within the cities of Medford and Somerville, MA. As part of the FERC/NEPA review process, we are requesting information on the presence of any planned residential subdivisions and/or planned commercial or industrial developments within 1/4 mile of the proposed project. Planned developments would include any recently permitted projects or projects currently under permit review. Within Medford, the proposed pipeline will commence at an existing meter station adjacent to the Mystic Valley Parkway, and extend within the Mystic Avenue corridor to the Somerville city line. If you could review the Medford portion of the attached project location map, and provide any information regarding planned developments, it would be greatly appreciated. If you are unable to provide the requested information, it would also be helpful if you could suggest another city department contact that may be able to provide assistance. Please feel free to contact me at the number below with any questions.

Thank you for your time,

**Nicole Libby**
*Project Specialist*

**ENSR**
95 State Road
Sagamore Beach, MA 02562-2415
Office (508) 888-3900 ext. 228
Fax (508) 888-6689
Cell (508) 944-2102

ENSR | AECOM

ENSR
[illegible]
[illegible]

October 18, 2007

City of Medford
Board of Health
Karen L. Rose - Director of Public Health
85 George P. Hassett Drive
Medford, MA 02155

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Ms. Rose:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- Municipal designated aquifers
- Municipal designated aquifer protection areas
- Surface waters that provide public drinking water supplies
- Municipal designated surface water protection areas
- Any known existing or proposed public or private drinking water wells within or springs within 300 feet of the proposed alignment

On behalf of Algonquin, ENSR requests that the City of Medford Board of Health conduct a review of the proposed alignment and identify any drinking water resources crossed by or within 0.25 miles of the proposed route, including any of the above reference resources. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett– Algonquin

Attachment - USGS quadrangle locus map

## Libby, Nicole

**From:** Libby, Nicole
**Sent:** Tuesday, April 01, 2008 10:27 AM
**To:** 'krose@medford.org'
**Subject:** Information Request
**Attachments:** Figure_1-1-1_J-2_Loop_Overview_topo.pdf; MedHealth.PDF

Ms. Rose

I spoke with Board of Health staff on the phone this morning, and they suggested I contact you via email in regards to the following request. Attached is a letter and project location map sent to the Medford Board of Health in October 2007. The request involves a natural gas pipeline looping Project located in Medford and Somerville, MA. Within Medford, the Project would commence at an existing meter station adjacent to the Mystic Valley Parkway and extend within the Mystic Avenue road corridor to the Somerville City line. As part of the FERC/NEPA filing process we are requesting information on the presence of any municipal designated aquifers, surface waters that provide drinking water supplies, municipal designated surface water protection areas, and any known existing or proposed public or private drinking water wells within 300 feet of the proposed alignment. If you could review the Medford portion of the attached Project location map and provide any information relative to the above mentioned resources, it would be greatly appreciated. If you are unable to provide the information, it would also be helpful if you could suggest another city department contact that may be able to provide this assistance.

Thank you for your time,

**Nicole Libby**
*Project Specialist*

**ENSR**
95 State Road
Sagamore Beach, MA 02562-2415
Office (508) 888-3900 ext. 228
Fax (508) 888-6689
Cell (508) 944-2102

**Libby, Nicole**

---

**From:** Zimmer, John
**Sent:** Monday, April 07, 2008 4:37 PM
**To:** Libby, Nicole
**Subject:** FW: Public Request for Wells in Medford, MA
**Attachments:** Well Regulations - FINAL - 2004.doc; Private Well Locations.xls

---

**From:** Kim Scanlon [mailto:kscanlon@medford.org]
**Sent:** Monday, April 07, 2008 3:23 PM
**To:** Zimmer, John
**Subject:** Public Request for Wells in Medford, MA

Dear Mr. Zimmer,

Medford Board of Health received your public record request and I wanted to get back to you as soon as possible. Per our regulation, no potable drinking wells are to be used for drinking water in Medford, MA. (I attached a copy of our regulations, see page 3). I also attached a list of our known well locations throughout the City of Medford, should you have any further questions, please do not hesitate to e-mail me at kscanlon@medford.org.

Sincerely,

Kimberly

4/8/2008

# Private Wells
City of Medford
Ma

| Num. | Well Location | Total Depth | Depth to Bedrock | Length into Bedrock | Static Water Level | Contractor | Owner | Well Use | Date |
|---|---|---|---|---|---|---|---|---|---|
| 17 | Abbott St | 110 Ft | 100 Ft | 50 Ft |  | Avellino General Con | Angelo Cieri | Irrigation |  |
| 590 | Boston Ave | 540 Ft | 18 Ft | 12 Ft | 30 Ft | LaRocque Wells Ltd | Tony Analetto | Irrigation | 4/13/92 |
| 37 | Hancock St | 105 Ft | 10 Ft | 10 Ft | 10 Ft | Avellino Well & Pump | Domenico Forcucci | Irrigation | 9/5/97 |
| 89 | Boston Ave | 150 Ft | 64 Ft |  | 18 Ft | LaRocque Wells Ltd | Angelo Caggiano | Irrigation | 8/29/91 |
| 509 | Boston Ave | 540 Ft | 18 Ft | 12 Ft | 30 Ft | LaRoque Wells Ltd | Tony Analetto | Irrigation | 4/13/92 |
| 80 | Brewster Rd | 505 Ft | 11 Ft | 10 Ft | 20 Ft | Avellino Well & Pump | Frank Seamster | Irrigation | 9/30/96 |
| 10 | Cabot Rd | 360 Ft | 100 Ft | 40 Ft | 20 Ft | A & W Artesian Well | Capital Properties Inc. | Domestic | 5/16/97 |
| 10 | Cabot Rd | 360 Ft | 100 Ft | 40 Ft | 20 Ft | A & W Artesian Well | Capital Properties Inc. | Domestic | 5/16/97 |
| 143 | Century St | 175 Ft | 100 Ft | 15 Ft | 10 Ft | Avellino Well & Pump | Elio Centoni | Irrigation | 11/5/93 |
| 15 | Chestnut St | 300 Ft | 65 Ft | 15 Ft | 15 Ft | T J. Ogden | Raymond Mitrano | Irrigation | 5/24/93 |
| 195 | Corporation Way | 14 Ft |  |  | 6 Ft | Guild Drilling Co Inc | Client. NCA | Monitoring | 3/29/00 |
| 31 | Daly Rd | 255 Ft | 20 Ft | 10 Ft | 15 Ft | Avelline Well & Pump | Anthony Porcaro | Irrigation | 6/26/93 |
| 35 | First Street | 305 Ft | 140 Ft | 20 Ft | 6 Ft | LaRocque Wells Ltd | Charles Cali | Irrigation | 7/9/91 |
| 86 | Fourth St | 305 Ft | 54 Ft | 16 Ft | 11 Ft | Avellino Well & Pump | Angelo Federico | Irrigation | 3/23/94 |
| 223 | Fulton St | 505 Ft | 7 Ft | 14Ft | 15 Ft | Avellino Well & Pump | Rocco Chiarella | Irrigation | 6/8/93 |
| 14 | Goldsmith Ave | 205 Ft | 45 Ft | 15 Ft | 5 Ft | Avellino Well & Pump | Frank Schiavone | Irrigation | 5/19/94 |
| 15 | Goldsmith Ave | 205 Ft | 45 Ft | 15 Ft | 5 Ft | Avellino Well & Pump | Franco Schiavone | Irrigation | 5/19/94 |
| 15 | Hancock St | 205 Ft | 6 Ft | 15 Ft | 9 Ft | LaRocque Wells Ltd | Giuseppe Fiore | Irrigation | 9/28/90 |
| 15 | Hancock St | 205 Ft | 6 Ft | 15 Ft | 9 Ft | LaRocque Wells Ltd | Giuseppe Fiore | Irrigation | 9/28/90 |
| 607 | High St | 305 Ft | 90 Ft | 35 Ft | 20 Ft | Avellino Well & Pump | Nicolo Cerundolo | Irrigation | 5/8/95 |
| 607 | High St | 305 Ft | 90 Ft | 35 Ft | 20 Ft | Avellino Well & Pump | Nicolo Cerundolo | Irrigation | 5/8/95 |
| 9 | Kenway St | 105 Ft | 10 Ft | 10 Ft | 10 Ft | Avellino Well & Pump | Clifford Blood | Irrigation | 9/30/96 |
| 74 | Lawrence Rd | 300 Ft | 36 Ft | 10 Ft | 23 Ft | American Artesian | Joseph Blake | Irrigation | 3/30/00 |
| 80 | Lawrence Rd ??? |  |  |  |  |  |  |  |  |
| 277 | Middlesex Ave Randy's Car |  | 160 Ft |  |  | D.L. Maher Co. | Randy's Car Wash |  | 3/28/89 |
| 41 | Pilgrim Rd | 490 Ft | 7 Ft | 13 Ft | 19 Ft | Avellino Well & Pump | Anthony Esposito | Irrigation | 11/10/93 |
| 20 | Powderhouse Rd Ext | 480 Ft | 7 Ft | 13 Ft | 13 Ft | Downeast Drilling | Ed Sutherby | Domestic | 12/16/99 |
| 40 | Ramshead Rd | 320 Ft | 27 Ft | 10 Ft | 20 Ft | Avellino Well & Pump | Michael Ciano | Irrigation | 11/10/99 |
| 17 | Royall St | 545 Ft | 40 Ft | 10 Ft |  | LaRocque Wells Ltd | Rocco Direnzo | Irrigation | 5/29/02 |
| 449 | Salem St | 45 Ft |  |  | 8 Ft | A&W Environmental | Clean Harbors Inc | Monitoring | 6/12/91 |
| 72 | Spring St | 200 Ft | 97 Ft | 97 Ft |  | Avellino General Con | Luigi Nuzzolo | Irrigation |  |
| 24 | Wareham St | 450 Ft | 30 Ft | 15Ft | 19Ft | Avelline Well & Pump | George Santini | Irrigation | 5/5/95 |
| 100-104 | Mystic Avenue | 12 Ft |  |  | 3 Ft | Technical Drilling Ser. | Tighe and Bond | Monitoring | 1/5/04 |
| 12 | Fairfield Street | 22 Ft |  |  | 16 Ft | Technical Drilling Ser. | Lessard Environmental | Monitoring | 5/13/03 |
| 40 | Revere Beach Parkway | 21 Ft |  |  | 3.2 Ft | Guild Drilling Co Inc | Haley & Aldrich Co | Monitoring | 8/12/03 |
| 18 | Locust Street | 10 Ft |  |  |  | Soil Exploration Corp | IES, Inc | Monitoring | 3/30/04 |
| 120 | Main Street | 16 Ft |  |  |  | Technical Drilling Ser. | Coler and Colontonio | Monitoring | 5/24/04 |
| 100 | North Hill Road | 20 Ft |  |  | 15 Ft | Technical Drilling Ser. | CMG | Monitoring | 6/21/04 |
| 3087 | Mystic Valley Parkway | 15 Ft |  |  | 8 Ft | Technical Drilling Ser. | JHB | Monitoring | 7/14/04 |
| 25 | Sycamore Avenue | 15 Ft |  |  | 7 Ft | Technical Drilling Ser. | Eco Environmental | Monitoring | 7/12/04 |
| 101 | Fourth St | 15 Ft |  |  | 7 Ft | Technical Drilling Ser. | BCS Inc | Monitoring | 9/16/04 |
| 530 | Winthrop Street | 14 Ft |  |  | 7 Ft | Technical Drilling Serv | Woodard & Curran | Monitoring | 11/29/04 |
| 14A | Central Ave |  |  |  | 6 Ft? | ? | Antonio Sciarratta |  |  |
| 357 | Mystic Avenue | 12 Ft |  |  | 7 Ft | Soil Exploration Corp | IES, Inc | Monitoring | 9/29/04 |
| 36 | Robinson Road | 600 Ft |  |  | 36 Ft | American Artesian | Michael Scola | Irrigation | 7/18/05 |
| 35 | Dexter Street | 500 Ft |  |  | 30 Ft | Avellino Well & Pump | Mike's Landscaping | Irrigation | 8/11/01 |
|  | Hormel Stadium | 17 Ft |  |  |  | Pine and Swallow Assoc | McPhail Assoc | Monitoring | 7/24/01 |
| 254 | Grove Street | 325 Ft |  |  | 40 Ft | American Artesian | Wayne Meehan | Irrigation | 1/12/02 |
| 9 | Playstead Road | 4 Ft |  |  |  | Soil Exploration Corp | Ransom Environmental | Monitoring | 10/27/05 |
| 164 | Fourth St | 12 Ft |  |  | 4 Ft | Soil Exploration Corp | IES, Inc | Monitoring | 2/21/06 |
| 187 | Park Street | 15 Ft |  |  | 8 Ft | Soil Exploration Corp | IES, Inc | Monitoring | 4/19/06 |
| 530 | Winthrop Street | 15 Ft |  |  | 8 Ft | Technical Drilling Ser. | Woodard & Curran | Monitoring | 6/16/06 |
| 294 | Harvard Street | 20 Ft |  |  | 14 Ft | Technical Drilling Ser. | Hermenau & Hermenau | Monitoring | 11/29/06 |
| 970 | Fellsway | 12 Ft |  |  | 6 Ft | Soil Exploration Corp | IES, Inc | Monitoring | 2/15/07 |
| 271 | Salem St | 15Ft | 10Ft |  |  | TDS, Inc | Snow Pease | Monitoring | 10/17/07 |

ENSR | AECOM

ENSR
[illegible]
[illegible]

October 18, 2007

City of Medford Water and Sewer Department
Mr. Davis Proctor
52 Swan Street
Medford, MA 02155

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Mr. Proctor

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- Municipal sewer systems in or within 0.25-miles of the proposed project

On behalf of Algonquin, ENSR requests that the City of Medford Water and Sewer Department conduct a review of the proposed alignment and identify any drinking water resources crossed by or within 0.25 miles of the proposed route, including any of the above reference resources. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified.

Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x206 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

**Libby, Nicole**

---

**From:** Libby, Nicole
**Sent:** Monday, March 31, 2008 1:23 PM
**To:** 'dbeston@medford.org'
**Subject:** ATT: Davis Proctor
**Attachments:** Figure_1-1-1_J-2_Loop_Overview_topo.pdf

Davis,

Thank you for speaking with me this morning in regards to the proposed J-2 Loop Project in Medford. As we discussed, ENSR is requesting information for the FERC/NEPA review process on drinking water resources within 0.25 miles of the proposed Project. The Project route within the City of Medford will remain the same as our original correspondence in October 2007. The proposed 14" natural gas pipeline loop will commence at the existing meter station adjacent to the Mystic Valley Parkway in Medford and follow the Mystic Avenue corridor to the Somerville City line. The attached Project locus map depicts the Project location within the city of Medford. Please review the attached map and identify any public/private drinking water resources crossed by or within 0.25 miles of the proposed route in Medford. Let me know if you have any questions and thank you for your time,

**Nicole Libby**
*Project Specialist*

**ENSR**
95 State Road
Sagamore Beach, MA 02562-2415
Office (508) 888-3900 ext. 228
Fax (508) 888-6689
Cell (508) 944-2102

ENSR | AECOM

ENSR
[illegible]
[illegible]

October 18, 2007

Somerville Health Department
Director Noreen Burke
City Hall Annex
50 Evergreen Avenue
Somerville, MA 02143

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Ms. Burke:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- Municipal designated aquifers
- Municipal designated aquifer protection areas
- Surface waters that provide public drinking water supplies
- Municipal designated surface water protection areas
- Any known existing or proposed public or private drinking water wells within or springs within 300 feet of the proposed alignment

On behalf of Algonquin, ENSR requests that the City of Somerville Health Department conduct a review of the proposed alignment and identify any drinking water resources crossed by or within

0.25 miles of the proposed route, including any of the above reference resources. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

ENSR | AECOM

ENSR
[illegible]
[illegible]

February 25, 2008

Somerville Health Department
Director Noreen Burke
City Hall Annex
50 Evergreen Avenue
Somerville, MA 02143

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Ms. Burke:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, consulted with the Environmental Protection Agency ("EPA") regarding the presence of existing or proposed Sole Source Aquifers crossed within 0.25 miles of the proposed J-2 Loop Project corridor in October of 2007. The J-2 Loop Project consists of the construction and installation of approximately two miles of new 14-inch outside diameter ("OD") natural gas loop pipeline within the cities of Medford and Somerville, Massachusetts. On October 23, 2007, EPA provided written consultation regarding the J-2 Project, and determined that there is no existing or proposed Sole Source Aquifer crossed within 0.25 miles of the proposed Project. Since receipt of this consultation, Algonquin has modified portions of the original J-2 Loop Project alignment.

The modified route will commence at an existing meter station located adjacent to the Mystic Valley Parkway in Medford. The Project will then continue south paralleling Interstate 93 to the corridor of Mystic Avenue. The alignment will then continue generally south and east within the Temple, Broadway, School, and Medford Street corridors to a terminus at an existing valve site located east of the McGrath Highway (Route 28) / Conrail overpass in Somerville. Please refer to the attached figure for a USGS topographic map depicting Algonquin's existing pipeline facilities as well as the modified J-2 Loop alignment.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- Municipal designated aquifers
- Municipal designated aquifer protection areas
- Surface waters that provide public drinking water supplies
- Municipal designated surface water protection areas
- Any known existing or proposed public or private drinking water wells within or springs within 300 feet of the proposed alignment

On behalf of Algonquin, ENSR requests that the City of Somerville Health Department conduct a review of the proposed alignment and identify any drinking water resources crossed by or within 0.25 miles of the proposed route, including any of the above reference resources. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

## Libby, Nicole

**From:** Libby, Nicole
**Sent:** Tuesday, April 01, 2008 10:03 AM
**To:** 'pmelaragni@ci.somerville.ma.us'
**Subject:** Information Request
**Attachments:** SomHealth.PDF; Figure_1-1-1_J-2_Loop_Overview_topo.pdf

Mr. Corricelli,

I spoke with Health Department staff this morning, and they suggested I get in touch with you in regards to an information request. Attached is a letter and project location map sent to the Somerville Health Department in February. The request involves a natural gas pipeline looping Project located in Somerville along the following roadway corridors: Mystic Avenue, Temple Street, Broadway, School Street and Medford Street. As part of the FERC/NEPA filing process we are requesting information on the presence of any municipal designated aquifers, surface waters that provide drinking water supplies, municipal designated surface water protection areas, and any known existing or proposed public or private drinking water wells within 300 feet of the proposed alignment. If you could review the attached Project location map and provide any information relative to the above mentioned resources, it would be greatly appreciated.

Thank you for your time,

**Nicole Libby**
*Project Specialist*

**ENSR**
95 State Road
Sagamore Beach, MA 02562-2415
Office (508) 888-3900 ext. 228
Fax (508) 888-6689
Cell (508) 944-2102

ENSR | AECOM

ENSR
[illegible]
[illegible]

October 18, 2007

City of Somerville
Water and Sewer Enterprise
Superintendent Carol Antonelli
17 Franey Road
Somerville, MA 02143

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Superintendent Antonelli:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, is currently evaluating a proposal to modify a portion of its existing pipeline system to provide increased natural gas supplies and enhanced system reliability to its customers in the greater Boston area. Specifically, Algonquin is proposing to expand its interstate pipeline in Medford and Somerville, Massachusetts. These proposed facilities would include the construction of approximately two (2) miles of new 14-inch diameter pipeline from Medford to Somerville, generally parallel to Algonquin's existing J-2 pipeline system. The proposed project is referred to as the J-2 Loop Project.

The project will commence adjacent to the McGrath Highway (Route 28) / Conrail overpass in Somerville, extend east and then north within the McGrath Highway (Rte 28), Broadway, and Mystic Avenue (Rte 38) corridors and terminating adjacent to the Mystic Valley Parkway in Medford. The majority of the proposed alignment is contained within existing roadways in densely developed / previously disturbed areas. The alignment also includes a section of ROW adjacent to Saxton Foss Park, a recreational area containing baseball fields and tennis courts.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- Any known existing or proposed public or private drinking water wells within or springs within 300 feet of the proposed alignment
- Municipal sewer systems

On behalf of Algonquin, ENSR requests that the City of Somerville Water and Sewer Enterprise conduct a review of the proposed alignment and identify any drinking water resources crossed by or within 0.25 miles of the proposed route, including any of the above reference resources. Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

ENSR | AECOM

ENSR
[illegible]
[illegible]

February 25, 2008

City of Somerville
Water and Sewer Enterprise
Superintendent Carol Antonelli
17 Franey Road
Somerville, MA 02143

Re: Information Request
J-2 Loop Project
Algonquin Gas Transmission, LLC
Somerville and Medford, MA

Dear Superintendent Antonelli:

Algonquin Gas Transmission, LLC ("Algonquin"), a subsidiary of Spectra Energy, consulted with the Environmental Protection Agency ("EPA") regarding the presence of existing or proposed Sole Source Aquifers crossed within 0.25 miles of the proposed J-2 Loop Project corridor in October of 2007. The J-2 Loop Project consists of the construction and installation of approximately two miles of new 14-inch outside diameter ("OD") natural gas loop pipeline within the cities of Medford and Somerville, Massachusetts. On October 23, 2007, EPA provided written consultation regarding the J-2 Project, and determined that there is no existing or proposed Sole Source Aquifer crossed within 0.25 miles of the proposed Project. Since receipt of this consultation, Algonquin has modified portions of the original J-2 Loop Project alignment.

The modified route will commence at an existing meter station located adjacent to the Mystic Valley Parkway in Medford. The Project will then continue south paralleling Interstate 93 to the corridor of Mystic Avenue. The alignment will then continue generally south and east within the Temple, Broadway, School, and Medford Street corridors to a terminus at an existing valve site located east of the McGrath Highway (Route 28) / Conrail overpass in Somerville. Please refer to the attached figure for a USGS topographic map depicting Algonquin's existing pipeline facilities as well as the modified J-2 Loop alignment.

An Environmental Report, required as part of the Federal Energy Regulatory Commission ("FERC") and National Environmental Policy Act ("NEPA") review process, is currently being prepared for the project. As part of the FERC NEPA review, it is necessary to determine whether the project will cross or be located within 0.25-miles of the following sensitive environmental areas:

- Any known existing or proposed public or private drinking water wells within or springs within 300 feet of the proposed alignment
- Municipal sewer systems

On behalf of Algonquin, ENSR requests that the City of Somerville Water and Sewer Enterprise conduct a review of the proposed alignment and identify any drinking water resources crossed by or within 0.25 miles of the proposed route, including any of the above reference resources.

Enclosed is a USGS topographic locus map within the proposed location of the alignment identified. Should you have any questions regarding this request or require any further information to complete your review, please do not hesitate to contact me via phone at 508-888-3900 x226 or via email at jzimmer@ensr.aecom.com. Thank you for your consideration and assistance.

Sincerely,

**ENSR Corporation**

John Zimmer

John Zimmer
Sr. Project Manager

Cc: William Brett – Algonquin

Attachment - USGS quadrangle locus map

CITY OF SOMERVILLE, MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

JOSEPH A. CURTATONE
MAYOR

**STAN KOTY**
*Commissioner*

**RICK WILLETTE**
*Director of Operations*

April 3, 2008

Mr. John Zimmer, Project Manager
ENSR
95 State Road
Sagamore Beach, MA 02562-2415

**RE: Information Request**
**J-2 Loop Project**
**Algonquin Gas Transmission, LLC**
**Somerville and Medford, MA**

Dear Mr. Zimmer:

I am answering your recent request with respect to municipally owned aquifers, surface water sources and public and private wells.

The City of Somerville receives all of its water supply from the Massachusetts Water Resources Authority's two main reservoirs, the Quabbin and the Wachusett. As such, the city does not utilize nor own any aquifers, surface water or below ground wells. The Somerville Board of Health would have a list if there are any private wells in the city.

If I can be of further assistance you can reach me at 617-625-6600 ext. 5410.

Sincerely,

Charles E. O'Brien

Charles E. O'Brien, P.E., Certified Operator Grade D4
City Engineer

Cc Carol Antonelli, Water Supt.
Noreen Burke, Director Board of Health

1 FRANEY ROAD • SOMERVILLE, MASSACHUSETTS 02145
(617) 625-6600 EXT. 5100 • FAX: (617) 623-7649
WWW.CI.SOMERVILLE.MA.US

Spectra Energy

# *Appendix C – FERC Plan and Procedures*

# UPLAND EROSION CONTROL, REVEGETATION, AND MAINTENANCE PLAN

01/17/2003 VERSION

## UPLAND EROSION CONTROL, REVEGETATION, AND MAINTENANCE PLAN

## TABLE OF CONTENTS

I. APPLICABILITY .... 1

II. SUPERVISION AND INSPECTION .... 2
- A. ENVIRONMENTAL INSPECTION .... 2
- B. RESPONSIBILITIES OF ENVIRONMENTAL INSPECTORS .... 2

III. PRECONSTRUCTION PLANNING .... 4
- A. CONSTRUCTION WORK AREAS .... 4
- B. DRAIN TILE AND IRRIGATION SYSTEMS .... 4
- C. GRAZING DEFERMENT .... 5
- D. ROAD CROSSINGS AND ACCESS POINTS .... 5
- E. DISPOSAL PLANNING .... 5
- F. AGENCY COORDINATION .... 5
- G. STORMWATER POLLUTION PREVENTION PLAN .... 5

IV. INSTALLATION .... 6
- A. APPROVED AREAS OF DISTURBANCE .... 6
- B. TOPSOIL SEGREGATION .... 7
- C. DRAIN TILES .... 7
- D. IRRIGATION .... 8
- E. ROAD CROSSINGS AND ACCESS POINTS .... 8
- F. TEMPORARY EROSION CONTROL .... 8
  - 1. Temporary Slope Breakers .... 8
  - 2. Sediment Barriers .... 9
  - 3. Mulch .... 10

V. RESTORATION .... 11
- A. CLEANUP .... 11
- B. PERMANENT EROSION CONTROL DEVICES .... 12
  - 1. Trench Breakers .... 12
  - 2. Permanent Slope Breakers .... 13
- C. SOIL COMPACTION MITIGATION .... 13
- D. REVEGETATION .... 14
  - 1. General .... 14
  - 2. Soil Additives .... 14
  - 3. Seeding Requirements .... 14

VI. OFF-ROAD VEHICLE CONTROL .... 16

VII. POST-CONSTRUCTION ACTIVITIES .... 16
- A. MONITORING AND MAINTENANCE .... 16
- B. REPORTING .... 17

01/17/2003 VERSION

# UPLAND EROSION CONTROL, REVEGETATION, AND MAINTENANCE PLAN (PLAN)

## I. APPLICABILITY

A. The intent of this Plan is to assist applicants by identifying baseline mitigation measures for minimizing erosion and enhancing revegetation. The project sponsors should specify in their applications for a FERC Certificate (Certificate) any individual measures in this Plan they consider unnecessary, technically infeasible, or unsuitable due to local conditions and to fully describe any alternative measures they would use. Applicants should also explain how those alternative measures would achieve a comparable level of mitigation.

Once a project is certificated, further changes can be approved. Any such changes from the measures in this Plan (or the applicant's approved plan) will be approved by the Director of the Office of Energy Projects (Director), upon the applicant's written request, if the Director agrees that an alternative measure:

1. provides equal or better environmental protection;
2. is necessary because a portion of this Plan is infeasible or unworkable based on project-specific conditions; or
3. is specifically required in writing by another Federal, state, or Native American land management agency for the portion of the project on its land or under its jurisdiction.

Any requirements in this Plan to file material with the Secretary of the FERC (Secretary) do not apply to projects undertaken under the provisions of the blanket certificate program. This exemption does not apply to a request for alternative measures.

Project-related impacts on wetland and waterbody systems are addressed in the staff's Wetland and Waterbody Construction and Mitigation Procedures (Procedures).

## II. SUPERVISION AND INSPECTION

### A. ENVIRONMENTAL INSPECTION

1. At least one Environmental Inspector is required for each construction spread during construction and restoration (as defined by section V). The number and experience of Environmental Inspectors assigned to each construction spread should be appropriate for the length of the construction spread and the number/significance of resources affected.

2. Environmental Inspectors shall have peer status with all other activity inspectors.

3. Environmental Inspectors shall have the authority to stop activities that violate the environmental conditions of the Certificate, state and Federal environmental permit conditions, or landowner requirements; and to order appropriate corrective action.

### B. RESPONSIBILITIES OF ENVIRONMENTAL INSPECTORS

At a minimum, the Environmental Inspector(s) shall be responsible for:

1. Ensuring compliance with the requirements of this Plan, the Procedures, the environmental conditions of the Certificate authorization, the mitigation measures proposed by the applicant (as approved and/or modified by the Certificate), other environmental permits and approvals, and environmental requirements in landowner easement agreements;

2. Identifying, documenting, and overseeing corrective actions, as necessary to bring an activity back into compliance;

3. Verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing;

4. Verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;

5. Identifying erosion/sediment control and soil stabilization needs in all areas;

6. Ensuring that the location of dewatering structures and slope breakers will not direct water into known cultural resources sites or locations of sensitive species;

7. Verifying that trench dewatering activities do not result in the deposition of sand, silt, and/or sediment near the point of discharge into a wetland or waterbody. If such deposition is occurring, the dewatering activity shall be stopped and the design of the discharge shall be changed to prevent reoccurrence;

8. Ensuring that subsoil and topsoil are tested in agricultural and residential areas to measure compaction and determine the need for corrective action;

9. Advising the Chief Construction Inspector when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive rutting;

10. Ensuring restoration of contours and topsoil;

11. Verifying that the soils imported for agricultural or residential use have been certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner;

12. Determining the need for and ensuring that erosion controls are properly installed, as necessary to prevent sediment flow into wetlands, waterbodies, sensitive areas, and onto roads;

13. Inspecting and ensuring the maintenance of temporary erosion control measures at least:

    a. on a daily basis in areas of active construction or equipment operation;

    b. on a weekly basis in areas with no construction or equipment operation; and

    c. within 24 hours of each 0.5 inch of rainfall;

14. Ensuring the repair of all ineffective temporary erosion control measures within 24 hours of identification;

15. Keeping records of compliance with the environmental conditions of the FERC certificate, and the mitigation measures proposed by the project sponsor in the application submitted to the FERC, and other Federal or state environmental permits during active construction and restoration; and

16. Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase.

## III. PRECONSTRUCTION PLANNING

The project sponsor shall do the following before construction:

### A. CONSTRUCTION WORK AREAS

1. Identify all construction work areas (e.g., construction right-of-way, extra work space areas, pipe storage and contractor yards, borrow and disposal areas, access roads, etc.) that would be needed for safe construction. The project sponsor must ensure that appropriate cultural resources and biological surveys have been conducted.

2. Project sponsors are encouraged to consider expanding any required cultural resources and endangered species surveys in anticipation of the need for activities outside of certificated work areas.

### B. DRAIN TILE AND IRRIGATION SYSTEMS

1. Attempt to locate existing drain tiles and irrigation systems.

2. Contact landowners and local soil conservation authorities to determine the locations of future drain tiles that are likely to be installed within 3 years of the authorized construction.

3. Develop procedures for constructing through drain-tiled areas, maintaining irrigation systems during construction, and repairing drain tiles and irrigation systems after construction.

4. Engage qualified drain tile specialists, as needed to conduct or monitor repairs to drain tile systems affected by construction. Use drain tile specialists from the project area, if available.

C. GRAZING DEFERMENT

Develop grazing deferment plans with willing landowners, grazing permittees, and land management agencies to minimize grazing disturbance of revegetation efforts.

D. ROAD CROSSINGS AND ACCESS POINTS

Plan for safe and accessible conditions at all roadway crossings and access points during construction and restoration.

E. DISPOSAL PLANNING

Determine methods and locations for the disposal of construction debris (e.g., timber, slash, mats, garbage, drilling fluids, excess rock, etc). Off-site disposal in other than commercially operated disposal locations is subject to compliance with all applicable survey, landowner permission, and mitigation requirements.

F. AGENCY COORDINATION

The project sponsor must coordinate with the appropriate local, state, and Federal agencies as outlined in this Plan and in the Certificate.

1. Obtain written recommendations from the local soil conservation authorities or land management agencies regarding permanent erosion control and revegetation specifications.

2. Develop specific procedures in coordination with the appropriate agency to prevent the introduction or spread of noxious weeds and soil pests resulting from construction and restoration activities.

G. STORMWATER POLLUTION PREVENTION PLAN

Make available on each construction spread the Stormwater Pollution Prevention Plan prepared for compliance with the U.S. Environmental Protection Agency's National Stormwater Program General Permit requirements.

## IV. INSTALLATION

### A. APPROVED AREAS OF DISTURBANCE

1. Project-related ground disturbance shall be limited to the construction right-of-way, extra work space areas, pipe storage yards, borrow and disposal areas, access roads, and other areas approved in the Certificate. Any project-related ground disturbing activities outside these Certificated areas, except those needed to comply with the Plan and Procedures (e.g., slope breakers, energy-dissipating devices, dewatering structures, drain tile system repairs) will require prior Director approval. All construction or restoration activities outside of the Certificated areas are subject to all applicable survey and mitigation requirements.

2. The construction right-of-way width for a project shall not exceed 75 feet or that described in the FERC application unless otherwise modified by a Certificate condition. However, in limited, non-wetland areas, this construction right-of-way width may be expanded by up to 25 feet without Director approval to accommodate full construction right-of-way topsoil segregation and to ensure safe construction where topographic conditions (such as side-slopes) or soil limitations require it. Twenty-five feet of extra construction right-of-way width may also be used in limited, non-wetland or non-forested areas for truck turn-arounds where no reasonable alternative access exists.

   Project use of these additional limited areas is subject to landowner approval and compliance with all applicable survey and mitigation requirements. When such additional areas are used, each one should be identified and the need explained in the weekly or biweekly construction reports to the FERC, if required. The following material should be included in the reports:

   a. the location of each additional area by station number and reference to a previously filed alignment sheet, or updated alignment sheets showing the additional areas;

   b. identification of where the Commission's records contain evidence that the additional areas were previously surveyed; and

c. a statement that landowner approval has been obtained and is available in project files.

Prior written approval of the Director is required when the Certificated construction right-of-way width would be expanded by more than 25 feet.

## B. TOPSOIL SEGREGATION

1. Unless the landowner or land management agency specifically approves otherwise, prevent the mixing of topsoil with subsoil by stripping topsoil from either the full work area or from the trench and subsoil storage area (ditch plus spoil side method) in:

   a. actively cultivated or rotated croplands and pastures;

   b. residential areas;

   c. hayfields; and

   d. other areas at the landowner's or land managing agency's request.

2. In residential areas importation of topsoil is an acceptable alternative to topsoil segregation.

3. In deep soils (more than 12 inches of topsoil), segregate at least 12 inches of topsoil. In soils with less than 12 inches of topsoil make every effort to segregate the entire topsoil layer.

4. Where topsoil segregation is required, maintain separation of salvaged topsoil and subsoil throughout all construction activities.

5. Segregated topsoil may not be used for padding the pipe.

## C. DRAIN TILES

1. Mark locations of drain tiles damaged during construction.

2. Probe all drainage tile systems within the area of disturbance to check for damage.

3. Repair damaged drain tiles to their original or better condition. Do not use filter-covered drain tiles unless the local soil conservation authorities and the landowner agree. Use qualified specialists for testing and repairs.

4. For new pipelines in areas where drain tiles exist or are planned, ensure that the depth of cover over the pipeline is sufficient to avoid interference with drain tile systems. For adjacent pipeline loops in agricultural areas, install the new pipeline with at least the same depth of cover as the existing pipeline(s).

## D. IRRIGATION

Maintain water flow in crop irrigation systems, unless shutoff is coordinated with affected parties.

## E. ROAD CROSSINGS AND ACCESS POINTS

1. Maintain safe and accessible conditions at all road crossings and access points during construction.

2. If crushed stone access pads are used in residential or active agricultural areas, place the stone on synthetic fabric to facilitate removal.

## F. TEMPORARY EROSION CONTROL

Install temporary erosion controls immediately after initial disturbance of the soil. Temporary erosion controls must be properly maintained throughout construction (on a daily basis) and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration is complete.

### 1. Temporary Slope Breakers

a. Temporary slope breakers are intended to reduce runoff velocity and divert water off the construction right-of-way. Temporary slope breakers may be constructed of materials such as soil, silt fence, staked hay or straw bales, or sand bags.

b. Install temporary slope breakers on all disturbed areas, as necessary to avoid excessive erosion. Temporary slope breakers must be installed on slopes greater than 5 percent where the base of the slope is less than 50 feet from waterbody, wetland, and road crossings at the following spacing (closer spacing should be used if necessary):

| Slope (%) | Spacing (feet) |
|---|---|
| 5 - 15 | 300 |
| >15 - 30 | 200 |
| >30 | 100 |

c. Direct the outfall of each temporary slope breaker to a stable, well vegetated area or construct an energy-dissipating device at the end of the slope breaker and off the construction right-of-way.

d. Position the outfall of each temporary slope breaker to prevent sediment discharge into wetlands, waterbodies, or other sensitive resources.

2. Sediment Barriers

a. Sediment barriers are intended to stop the flow of sediments and to prevent the deposition of sediments into sensitive resources. They may be constructed of materials such as silt fence, staked hay or straw bales, compacted earth (e.g., driveable berms across travelways), sand bags, or other appropriate materials.

b. At a minimum, install and maintain temporary sediment barriers across the entire construction right-of-way at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from a waterbody, wetland, or road crossing until revegetation is successful as defined in this Plan. Leave adequate room between the base of the slope and the sediment barrier to accommodate ponding of water and sediment deposition.

c. Where wetlands or waterbodies are adjacent to and downslope of construction work areas, install sediment barriers along the edge of these areas, as necessary to prevent sediment flow into the wetland or waterbody.

3. Mulch

a. Apply mulch on all slopes (except in actively cultivated cropland) concurrent with or immediately after seeding, where necessary to stabilize the soil surface and to reduce wind and water erosion. Spread mulch uniformly over the area to cover at least 75 percent of the ground surface at a rate of 2 tons/acre of straw or its equivalent, unless the local soil conservation authority, landowner, or land managing agency approves otherwise in writing.

b. Mulch can consist of weed-free straw or hay, wood fiber hydromulch, erosion control fabric, or some functional equivalent.

c. Mulch before seeding if:

(1) final grading and installation of permanent erosion control measures will not be completed in an area within 20 days after the trench in that area is backfilled (10 days in residential areas), as required in section V.A.1; or

(2) construction or restoration activity is interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions.

d. If mulching before seeding, increase mulch application on all slopes within 100 feet of waterbodies and wetlands to a rate of 3 tons/acre of straw or equivalent.

e. If wood chips are used as mulch, do not use more than 1 ton/acre and add the equivalent of 11 lbs/acre available nitrogen (at least 50 percent of which is slow release).

f. Ensure that mulch is adequately anchored to minimize loss due to wind and water.

g. When anchoring with liquid mulch binders, use rates recommended by the manufacturer. Do not use liquid mulch binders within 100 feet of wetlands or waterbodies.

h. Install erosion control fabric on waterbody banks at the time of final bank recontouring. Anchor the erosion control fabric with staples or other appropriate devices.

## V. RESTORATION

### A. CLEANUP

1. Commence cleanup operations immediately following backfill operations. Complete final grading, topsoil replacement, and installation of permanent erosion control structures within 20 days after backfilling the trench (10 days in residential areas). If seasonal or other weather conditions prevent compliance with these time frames, maintain temporary erosion controls (temporary slope breakers and sediment barriers) until conditions allow completion of cleanup.

   The project sponsor should file with the Secretary for the review and written approval of the Director, a winterization plan if construction will continue into the winter season when conditions could delay successful decompaction, topsoil replacement, or seeding until the following spring.

2. A travel lane may be left open temporarily to allow access by construction traffic if the temporary erosion control structures are installed (as specified in section IV.F.) and inspected and maintained (as specified in sections II.B.12 through 14). When access is no longer required, the travel lane must be removed and the right-of-way restored.

3. Rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile. Rock that is not returned to the trench should be considered construction debris, unless approved for use as mulch or for some other use on the construction work areas by the landowner or land managing agency.

4. Remove excess rock from at least the top 12 inches of soil in all actively cultivated or rotated cropland and pastures, hayfields, and residential areas, as well as other areas at the landowner's request. The size, density, and distribution of rock on the construction work area should be similar to adjacent areas not disturbed by construction. The landowner may approve other provisions in writing.

5. Grade the construction right-of-way to restore pre-construction contours and leave the soil in the proper condition for planting.

6. Remove construction debris from all construction work areas unless the landowner or land managing agency approves otherwise.

7. Remove temporary sediment barriers when replaced by permanent erosion control measures or when revegetation is successful.

## B. PERMANENT EROSION CONTROL DEVICES

### 1. Trench Breakers

a. Trench breakers are intended to slow the flow of subsurface water along the trench. Trench breakers may be constructed of materials such as sand bags or polyurethane foam. Do not use topsoil in trench breakers.

b. An engineer or similarly qualified professional shall determine the need for and spacing of trench breakers. Otherwise, trench breakers shall be installed at the same spacing as and upslope of permanent slope breakers.

c. In agricultural fields and residential areas where slope breakers are not typically required, install trench breakers at the same spacing as if permanent slope breakers were required.

d. At a minimum, install a trench breaker at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from a waterbody or wetland and where needed to avoid draining a waterbody or wetland.

2. Permanent Slope Breakers

   a. Permanent slope breakers are intended to reduce runoff velocity, divert water off the construction right-of-way, and prevent sediment deposition into sensitive resources. Permanent slope breakers may be constructed of materials such as soil, sand bags, or some functional equivalent.

   b. Construct and maintain permanent slope breakers in all areas, except cultivated areas and lawns, using spacing recommendations obtained from the local soil conservation authority or land managing agency.

      In the absence of written recommendations, use the following spacing unless closer spacing is necessary to avoid excessive erosion on the construction right-of-way:

| Slope (%) | Spacing (feet) |
|---|---|
| 5 - 15 | 300 |
| >15 - 30 | 200 |
| >30 | 100 |

   c. Construct slope breakers to divert surface flow to a stable area without causing water to pool or erode behind the breaker. In the absence of a stable area, construct appropriate energy-dissipating devices at the end of the breaker.

   d. Slope breakers may extend slightly (about 4 feet) beyond the edge of the construction right-of-way to effectively drain water off the disturbed area. Where slope breakers extend beyond the edge of the construction right-of-way, they are subject to compliance with all applicable survey requirements.

C. SOIL COMPACTION MITIGATION

1. Test topsoil and subsoil for compaction at regular intervals in agricultural and residential areas disturbed by construction activities. Conduct tests on the same soil type under similar moisture conditions in undisturbed areas to approximate preconstruction conditions. Use penetrometers or other appropriate devices to conduct tests.

2. Plow severely compacted agricultural areas with a paraplow or other deep tillage implement. In areas where topsoil has been segregated, plow the subsoil before replacing the segregated topsoil.

   Alternatively, make arrangements with the landowner to plant and plow under a "green manure" crop, such as alfalfa, to decrease soil bulk density and improve soil structure. If subsequent construction and cleanup activities result in further compaction, conduct additional tilling.

3. Perform appropriate soil compaction mitigation in severely compacted residential areas.

## D. REVEGETATION

### 1. General

a. The project sponsor is responsible for ensuring successful revegetation of soils disturbed by project-related activities, except as noted in section V.D.1.b.

b. Restore all turf, ornamental shrubs, and specialized landscaping in accordance with the landowner's request, or compensate the landowner. Restoration work must be performed by personnel familiar with local horticultural and turf establishment practices.

### 2. Soil Additives

Fertilize and add soil pH modifiers in accordance with written recommendations obtained from the local soil conservation authority, land management agencies, or landowner. Incorporate recommended soil pH modifier and fertilizer into the top 2 inches of soil as soon as possible after application.

### 3. Seeding Requirements

a. Prepare a seedbed in disturbed areas to a depth of 3 to 4 inches using appropriate equipment to provide a firm seedbed. When hydroseeding, scarify the seedbed to facilitate lodging and germination of seed.

b. Seed disturbed areas in accordance with written recommendations for seed mixes, rates, and dates obtained from the local soil conservation authority or as requested by the landowner or land management agency. Seeding is not required in actively cultivated croplands unless requested by the landowner.

c. Perform seeding of permanent vegetation within the recommended seeding dates. If seeding cannot be done within those dates, use appropriate temporary erosion control measures discussed in section IV.F. and perform seeding of permanent vegetation at the beginning of the next recommended seeding season. Lawns may be seeded on a schedule established with the landowner.

d. In the absence of written recommendations from the local soil conservation authorities, seed all disturbed soils within 6 working days of final grading, weather and soil conditions permitting, subject to the specifications in section V.D.3.a-c.

e. Base seeding rates on Pure Live Seed. Use seed within 12 months of seed testing.

f. Treat legume seed with an inoculant specific to the species using the manufacturer's recommended rate of inoculant appropriate for the seeding method (broadcast, drill, or hydro).

g. In the absence of written recommendations from the local soil conservation authorities, landowner, or land managing agency to the contrary, a seed drill equipped with a cultipacker is preferred for seed application.

Broadcast or hydroseeding can be used in lieu of drilling at double the recommended seeding rates. Where seed is broadcast, firm the seedbed with a cultipacker or imprinter after seeding. In rocky soils or where site conditions may limit the effectiveness of this equipment, other alternatives may be appropriate (e.g., use of a chain drag) to lightly cover seed after application, as approved by the Environmental Inspector.

## VI. OFF-ROAD VEHICLE CONTROL

To each owner or manager of forested lands offer to install and maintain measures to control unauthorized vehicle access to the right-of-way. These measures may include:

A. Signs;

B. Fences with locking gates;

C. Slash and timber barriers, pipe barriers, or a line of boulders across the right-of-way; and

D. Conifers or other appropriate trees or shrubs across the right-of-way.

## VII. POST-CONSTRUCTION ACTIVITIES

### A. MONITORING AND MAINTENANCE

1. Conduct follow-up inspections of all disturbed areas after the first and second growing seasons to determine the success of revegetation.

2. Revegetation in non-agricultural areas shall be considered successful if upon visual survey the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. In agricultural areas, revegetation shall be considered successful if crop yields are similar to adjacent undisturbed portions of the same field.

   Continue revegetation efforts until revegetation is successful.

3. Monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in active agricultural areas until restoration is successful.

4. Restoration shall be considered successful if the right-of-way surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless requested otherwise by the land owner or land managing agency), revegetation is successful, and proper drainage has been restored.

5. Routine vegetation maintenance clearing shall not be done more frequently than every 3 years. However, to facilitate periodic corrosion and leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be maintained annually in a herbaceous state. In no case shall routine vegetation maintenance clearing occur between April 15 and August 1 of any year.

6. Efforts to control unauthorized off-road vehicle use, in cooperation with the landowner, shall continue throughout the life of the project. Maintain signs, gates, and vehicle trails as necessary.

B. REPORTING

1. The project sponsor shall maintain records that identify by milepost:

   a. method of application, application rate, and type of fertilizer, pH modifying agent, seed, and mulch used;

   b. acreage treated;

   c. dates of backfilling and seeding;

   d. names of landowners requesting special seeding treatment and a description of the follow-up actions; and

   e. any problem areas and how they were addressed.

2. The project sponsor shall file with the Secretary quarterly activity reports documenting problems, including those identified by the landowner, and corrective actions taken for at least 2 years following construction.

# WETLAND AND WATERBODY CONSTRUCTION AND MITIGATION PROCEDURES

01/17/2003 VERSION

# WETLAND AND WATERBODY CONSTRUCTION AND MITIGATION PROCEDURES

## TABLE OF CONTENTS

I. APPLICABILITY ........ 1

II. PRECONSTRUCTION FILING ........ 2

III. ENVIRONMENTAL INSPECTORS ........ 3

IV. PRECONSTRUCTION PLANNING ........ 3

V. WATERBODY CROSSINGS ........ 5
  A. NOTIFICATION PROCEDURES AND PERMITS ........ 5
  B. INSTALLATION ........ 6
    1. Time Window for Construction ........ 6
    2. Extra Work Areas ........ 6
    3. General Crossing Procedures ........ 6
    4. Spoil Pile Placement and Control ........ 7
    5. Equipment Bridges ........ 7
    6. Dry-Ditch Crossing Methods ........ 8
    7. Crossings of Minor Waterbodies ........ 10
    8. Crossings of Intermediate Waterbodies ........ 11
    9. Crossings of Major Waterbodies ........ 11
    10. Temporary Erosion and Sediment Control ........ 12
    11. Trench Dewatering ........ 12
  C. RESTORATION ........ 13
  D. POST-CONSTRUCTION MAINTENANCE ........ 14

VI. WETLAND CROSSINGS ........ 14
  A. GENERAL ........ 14
  B. INSTALLATION ........ 16
    1. Extra Work Areas and Access Roads ........ 16
    2. Crossing Procedures ........ 17
    3. Temporary Sediment Control ........ 19
    4. Trench Dewatering ........ 19
  C. RESTORATION ........ 20
  D. POST-CONSTRUCTION MAINTENANCE ........ 21

VII. HYDROSTATIC TESTING ........ 22
  A. NOTIFICATION PROCEDURES AND PERMITS ........ 22
  B. GENERAL ........ 22
  C. INTAKE SOURCE AND RATE ........ 22
  D. DISCHARGE LOCATION, METHOD, AND RATE ........ 23

01/17/2003 VERSION

# WETLAND AND WATERBODY CONSTRUCTION AND MITIGATION PROCEDURES (PROCEDURES)

## I. APPLICABILITY

A. The intent of these Procedures is to assist applicants by identifying baseline mitigation measures for minimizing the extent and duration of project-related disturbance on wetlands and waterbodies. The project sponsors should specify in their applications for a FERC Certificate (Certificate) any individual measures in these Procedures they consider unnecessary, technically infeasible, or unsuitable due to local conditions and to fully describe any alternative measures they would use. Applicants should also explain how those alternative measures would achieve a comparable level of mitigation.

Once a project is certificated, further changes can be approved. Any such changes from the measures in these Procedures (or the applicant's approved procedures) will be approved by the Director of the Office of Energy Projects (Director), upon the applicant's written request, if the Director agrees that an alternative measure:

1. provides equal or better environmental protection;
2. is necessary because a portion of these Procedures is infeasible or unworkable based on project-specific conditions; or
3. is specifically required in writing by another Federal, state, or Native American land management agency for the portion of the project on its land or under its jurisdiction.

Any requirements in these Procedures to file material with the Secretary of the FERC (Secretary) do not apply to projects undertaken under the provisions of the blanket certificate program. This exemption does not apply to a request for alternative measures.

Project-related impacts on non-wetland areas are addressed in the staff's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan).

## B. DEFINITIONS

1. "Waterbody" includes any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as ponds and lakes:

    a. "minor waterbody" includes all waterbodies less than or equal to 10 feet wide at the water's edge at the time of crossing;

    b. "intermediate waterbody" includes all waterbodies greater than 10 feet wide but less than or equal to 100 feet wide at the water's edge at the time of crossing; and

    c. "major waterbody" includes all waterbodies greater than 100 feet wide at the water's edge at the time of crossing.

2. "Wetland" includes any area that is not in actively cultivated or rotated cropland and that satisfies the requirements of the current Federal methodology for identifying and delineating wetlands.

## II. PRECONSTRUCTION FILING

A. The following information shall be filed with the Secretary prior to the beginning of construction:

1. the hydrostatic testing information specified in section VII.B.3. and a wetland delineation report as described in section VI.A.1., if applicable; and

2. a schedule identifying when trenching or blasting would occur within each waterbody greater than 10 feet wide, or within any designated coldwater fishery. The project sponsor shall revise the schedule as necessary to provide FERC staff at least 14 days advance notice. Changes within this last 14-day period must provide for at least 48 hours advance notice.

B. The following site-specific construction plans required by these Procedures must be filed with the Secretary for the review and written approval by the Director:

1. plans for extra work areas that would be closer than 50 feet from a waterbody or wetland;

2. plans for major waterbody crossings;

3. plans for the use of a construction right-of-way greater than 75 feet wide in wetlands; and

4. plans for horizontal directional drill (HDD) "crossings" of wetlands or waterbodies.

## III. ENVIRONMENTAL INSPECTORS

A. At least one Environmental Inspector having knowledge of the wetland and waterbody conditions in the project area is required for each construction spread. The number and experience of Environmental Inspectors assigned to each construction spread should be appropriate for the length of the construction spread and the number/significance of resources affected.

B. The Environmental Inspector's responsibilities are outlined in the Upland Erosion Control, Revegetation, and Maintenance Plan (Plan).

## IV. PRECONSTRUCTION PLANNING

A. A copy of the Stormwater Pollution Prevention Plan (SWPPP) prepared for compliance with the U.S. Environmental Protection Agency's (EPA) National Stormwater Program General Permit requirements must be available in the field on each construction spread. The SWPPP shall contain Spill Prevention and Response Procedures that meet the requirements of state and Federal agencies.

1. It shall be the responsibility of the project sponsor and its contractors to structure their operations in a manner that reduces the risk of spills or the accidental exposure of fuels or hazardous materials to waterbodies or wetlands. The project sponsor and its contractors must, at a minimum, ensure that:

    a. all employees handling fuels and other hazardous materials are properly trained;

    b. all equipment is in good operating order and inspected on a regular basis;

c. fuel trucks transporting fuel to on-site equipment travel only on approved access roads;

d. all equipment is parked overnight and/or fueled at least 100 feet from a waterbody or in an upland area at least 100 feet from a wetland boundary. These activities can occur closer only if the Environmental Inspector finds, in advance, no reasonable alternative and the project sponsor and its contractors have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill;

e. hazardous materials, including chemicals, fuels, and lubricating oils, are not stored within 100 feet of a wetland, waterbody, or designated municipal watershed area, unless the location is designated for such use by an appropriate governmental authority. This applies to storage of these materials and does not apply to normal operation or use of equipment in these areas; and

f. concrete coating activities are not performed within 100 feet of a wetland or waterbody boundary, unless the location is an existing industrial site designated for such use.

2. The project sponsor and its contractors must structure their operations in a manner that provides for the prompt and effective cleanup of spills of fuel and other hazardous materials. At a minimum, the project sponsor and its contractors must:

   a. ensure that each construction crew (including cleanup crews) has on hand sufficient supplies of absorbent and barrier materials to allow the rapid containment and recovery of spilled materials and knows the procedure for reporting spills;

   b. ensure that each construction crew has on hand sufficient tools and material to stop leaks;

c. know the contact names and telephone numbers for all local, state, and Federal agencies (including, if necessary, the U. S. Coast Guard and the National Response Center) that must be notified of a spill; and

d. follow the requirements of those agencies in cleaning up the spill, in excavating and disposing of soils or other materials contaminated by a spill, and in collecting and disposing of waste generated during spill cleanup.

### B. AGENCY COORDINATION

The project sponsor must coordinate with the appropriate local, state, and Federal agencies as outlined in these Procedures and in the Certificate.

## V. WATERBODY CROSSINGS

### A. NOTIFICATION PROCEDURES AND PERMITS

1. Apply to the U.S. Army Corps of Engineers (COE), or its delegated agency, for the appropriate wetland and waterbody crossing permits.

2. Provide written notification to authorities responsible for potable surface water supply intakes located within 3 miles downstream of the crossing at least 1 week before beginning work in the waterbody, or as otherwise specified by that authority.

3. Apply for state-issued waterbody crossing permits and obtain individual or generic section 401 water quality certification or waiver.

4. Notify appropriate state authorities at least 48 hours before beginning trenching or blasting within the waterbody, or as specified in state permits.

## B. INSTALLATION

### 1. Time Window for Construction

Unless expressly permitted or further restricted by the appropriate state agency in writing on a site-specific basis, instream work, except that required to install or remove equipment bridges, must occur during the following time windows:

a. coldwater fisheries - June 1 through September 30; and

b. coolwater and warmwater fisheries - June 1 through November 30.

### 2. Extra Work Areas

a. Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from water's edge, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land.

b. The project sponsor shall file with the Secretary for review and written approval by the Director, a site-specific construction plan for each extra work area with a less than 50-foot setback from the water's edge, (except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land) and a site-specific explanation of the conditions that will not permit a 50-foot setback.

c. Limit clearing of vegetation between extra work areas and the edge of the waterbody to the certificated construction right-of-way.

d. Limit the size of extra work areas to the minimum needed to construct the waterbody crossing.

### 3. General Crossing Procedures

a. Comply with the COE, or its delegated agency, permit terms and conditions.

b. Construct crossings as close to perpendicular to the axis of the waterbody channel as engineering and routing conditions permit.

c. If the pipeline parallels a waterbody, attempt to maintain at least 15 feet of undisturbed vegetation between the waterbody (and any adjacent wetland) and the construction right-of-way.

d. Where waterbodies meander or have multiple channels, route the pipeline to minimize the number of waterbody crossings.

e. Maintain adequate flow rates to protect aquatic life, and prevent the interruption of existing downstream uses.

f. Waterbody buffers (extra work area setbacks, refueling restrictions, etc.) must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

4. Spoil Pile Placement and Control

a. All spoil from minor and intermediate waterbody crossings, and upland spoil from major waterbody crossings, must be placed in the construction right-of-way at least 10 feet from the water's edge or in additional extra work areas as described in section V.B.2.

b. Use sediment barriers to prevent the flow of spoil or heavily silt-laden water into any waterbody.

5. Equipment Bridges

a. Only clearing equipment and equipment necessary for installation of equipment bridges may cross waterbodies prior to bridge installation. Limit the number of such crossings of each waterbody to one per piece of clearing equipment.

b. Construct equipment bridges to maintain unrestricted flow and to prevent soil from entering the waterbody. Examples of such bridges include:

   (1) equipment pads and culvert(s);
   (2) equipment pads or railroad car bridges without culverts;
   (3) clean rock fill and culvert(s); and
   (4) flexi-float or portable bridges.

   Additional options for equipment bridges may be utilized that achieve the performance objectives noted above. Do not use soil to construct or stabilize equipment bridges.

c. Design and maintain each equipment bridge to withstand and pass the highest flow expected to occur while the bridge is in place. Align culverts to prevent bank erosion or streambed scour. If necessary, install energy dissipating devices downstream of the culverts.

d. Design and maintain equipment bridges to prevent soil from entering the waterbody.

e. Remove equipment bridges as soon as possible after permanent seeding unless the COE, or its delegated agency, authorizes it as a permanent bridge.

f. If there will be more than 1 month between final cleanup and the beginning of permanent seeding and reasonable alternative access to the right-of-way is available, remove equipment bridges as soon as possible after final cleanup.

6. Dry-Ditch Crossing Methods

   a. Unless approved otherwise by the appropriate state agency, install the pipeline using one of the dry-ditch methods outlined below for crossings of waterbodies up to 30 feet wide (at the water's edge at the time of construction) that are state-designated as either coldwater or significant coolwater or warmwater fisheries.

b. Dam and Pump

(1) The dam-and-pump method may be used without prior approval for crossings of waterbodies where pumps can adequately transfer streamflow volumes around the work area, and there are no concerns about sensitive species passage.

(2) Implementation of the dam-and-pump crossing method must meet the following performance criteria:

(i) use sufficient pumps, including on-site backup pumps, to maintain downstream flows;
(ii) construct dams with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner);
(iii) screen pump intakes;
(iv) prevent streambed scour at pump discharge; and
(v) monitor the dam and pumps to ensure proper operation throughout the waterbody crossing.

c. Flume Crossing

The flume crossing method requires implementation of the following steps:

(1) install flume pipe after blasting (if necessary), but before any trenching;

(2) use sand bag or sand bag and plastic sheeting diversion structure or equivalent to develop an effective seal and to divert stream flow through the flume pipe (some modifications to the stream bottom may be required in to achieve an effective seal);

(3) properly align flume pipe(s) to prevent bank erosion and streambed scour;

(4) do not remove flume pipe during trenching, pipelaying, or backfilling activities, or initial streambed restoration efforts; and

(5) remove all flume pipes and dams that are not also part of the equipment bridge as soon as final cleanup of the stream bed and bank is complete.

d. Horizontal Directional Drill (HDD)

To the extent they were not provided as part of the pre-certification process, for each waterbody or wetland that would be crossed using the HDD method, provide a plan that includes:

(1) site-specific construction diagrams that show the location of mud pits, pipe assembly areas, and all areas to be disturbed or cleared for construction;

(2) a description of how an inadvertent release of drilling mud would be contained and cleaned up; and

(3) a contingency plan for crossing the waterbody or wetland in the event the directional drill is unsuccessful and how the abandoned drill hole would be sealed, if necessary.

7. Crossings of Minor Waterbodies

Where a dry-ditch crossing is not required, minor waterbodies may be crossed using the open-cut crossing method, with the following restrictions:

a. except for blasting and other rock breaking measures, complete instream construction activities (including trenching, pipe installation, backfill, and restoration of the streambed contours) within 24 hours. Streambanks and unconsolidated streambeds may require additional restoration after this period;

b. limit use of equipment operating in the waterbody to that needed to construct the crossing; and

c. equipment bridges are not required at minor waterbodies that do not have a state-designated fishery classification (e.g., agricultural or intermittent drainage ditches). However, if an equipment bridge is used it must be constructed as described in section V.B.5.

8. Crossings of Intermediate Waterbodies

Where a dry-ditch crossing is not required, intermediate waterbodies may be crossed using the open-cut crossing method, with the following restrictions:

a. complete instream construction activities (not including blasting and other rock breaking measures) within 48 hours, unless site-specific conditions make completion within 48 hours infeasible;

b. limit use of equipment operating in the waterbody to that needed to construct the crossing; and

c. all other construction equipment must cross on an equipment bridge as specified in section V.B.5.

9. Crossings of Major Waterbodies

Before construction, the project sponsor shall file with the Secretary for the review and written approval by the Director a detailed, site-specific construction plan and scaled drawings identifying all areas to be disturbed by construction for each major waterbody crossing (the scaled drawings are not required for any offshore portions of pipeline projects). This plan should be developed in consultation with the appropriate state and Federal agencies and should include extra work areas, spoil storage areas, sediment control structures, etc., as well as mitigation for navigational issues.

The Environmental Inspector may adjust the final placement of the erosion and sediment control structures in the field to maximize effectiveness.

10. Temporary Erosion and Sediment Control

Install sediment barriers (as defined in section IV.F.2.a. of the Plan) immediately after initial disturbance of the waterbody or adjacent upland. Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in the Plan; however, the following specific measures must be implemented at stream crossings:

a. install sediment barriers across the entire construction right-of-way at all waterbody crossings, where necessary to prevent the flow of sediments into the waterbody. In the travel lane, these may consist of removable sediment barriers or driveable berms. Removable sediment barriers can be removed during the construction day, but must be re-installed after construction has stopped for the day and/or when heavy precipitation is imminent;

b. where waterbodies are adjacent to the construction right-of-way, install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil and sediment within the construction right-of-way; and

c. use trench plugs at all waterbody crossings, as necessary, to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody.

11. Trench Dewatering

Dewater the trench (either on or off the construction right-of-way) in a manner that does not cause erosion and does not result in heavily silt-laden water flowing into any waterbody. Remove the dewatering structures as soon as possible after the completion of dewatering activities.

## C. RESTORATION

1. Use clean gravel or native cobbles for the upper 1 foot of trench backfill in all waterbodies that contain coldwater fisheries.

2. For open-cut crossings, stabilize waterbody banks and install temporary sediment barriers within 24 hours of completing instream construction activities. For dry-ditch crossings, complete streambed and bank stabilization before returning flow to the waterbody channel.

3. Return all waterbody banks to preconstruction contours or to a stable angle of repose as approved by the Environmental Inspector.

4. Application of riprap for bank stabilization must comply with COE, or its delegated agency, permit terms and conditions.

5. Unless otherwise specified by state permit, limit the use of riprap to areas where flow conditions preclude effective vegetative stabilization techniques such as seeding and erosion control fabric.

6. Revegetate disturbed riparian areas with conservation grasses and legumes or native plant species, preferably woody species.

7. Install a permanent slope breaker across the construction right-of-way at the base of slopes greater than 5 percent that are less than 50 feet from the waterbody, or as needed to prevent sediment transport into the waterbody. In addition, install sediment barriers as outlined in the Plan.
   In some areas, with the approval of the Environmental Inspector, an earthen berm may be suitable as a sediment barrier adjacent to the waterbody.

8. Sections V.C.3. through V.C.6. above also apply to those perennial or intermittent streams not flowing at the time of construction.

### D. POST-CONSTRUCTION MAINTENANCE

1. Limit vegetation maintenance adjacent to waterbodies to allow a riparian strip at least 25 feet wide, as measured from the waterbody's mean high water mark, to permanently revegetate with native plant species across the entire construction right-of-way. However, to facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be maintained in a herbaceous state. In addition, trees that are located within 15 feet of the pipeline that are greater than 15 feet in height may be cut and removed from the permanent right-of-way.

2. Do not use herbicides or pesticides in or within 100 feet of a waterbody except as allowed by the appropriate land management or state agency.

## VI. WETLAND CROSSINGS

### A. GENERAL

1. The project sponsor shall conduct a wetland delineation using the current Federal methodology and file a wetland delineation report with the Secretary before construction. This report shall identify:

   a. by milepost all wetlands that would be affected;

   b. the National Wetlands Inventory (NWI) classification for each wetland;

   c. the crossing length of each wetland in feet; and

   d. the area of permanent and temporary disturbance that would occur in each wetland by NWI classification type.

   The requirements outlined in this section do not apply to wetlands in actively cultivated or rotated cropland. Standard upland protective measures, including workspace and topsoiling requirements, apply to these agricultural wetlands.

2. Route the pipeline to avoid wetland areas to the maximum extent possible. If a wetland cannot be avoided or crossed by following an existing right-of-way, route the new pipeline in a manner that minimizes disturbance to wetlands. Where looping an existing pipeline, overlap the existing pipeline right-of-way with the new construction right-of-way. In addition, locate the loop line no more than 25 feet away from the existing pipeline unless site-specific constraints would adversely affect the stability of the existing pipeline.

3. Limit the width of the construction right-of-way to 75 feet or less. Prior written approval of the Director is required where topographic conditions or soil limitations require that the construction right-of-way width within the boundaries of a federally delineated wetland be expanded beyond 75 feet. Early in the planning process the project sponsor is encouraged to identify site-specific areas where existing soils lack adequate unconfined compressive strength that would result in excessively wide ditches and/or difficult to contain spoil piles.

4. Wetland boundaries and buffers must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

5. Implement the measures of sections V. and VI. in the event a waterbody crossing is located within or adjacent to a wetland crossing. If all measures of sections V. and VI. cannot be met, the project sponsor must file with the Secretary a site-specific crossing plan for review and written approval by the Director before construction. This crossing plan shall address at a minimum:

   a. spoil control;

   b. equipment bridges;

   c. restoration of waterbody banks and wetland hydrology;

   d. timing of the waterbody crossing;

e. method of crossing; and

f. size and location of all extra work areas.

6. Do not locate aboveground facilities in any wetland, except where the location of such facilities outside of wetlands would prohibit compliance with U.S. Department of Transportation regulations.

## B. INSTALLATION

### 1. Extra Work Areas and Access Roads

a. Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from wetland boundaries, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land.

b. The project sponsor shall file with the Secretary for review and written approval by the Director, a site-specific construction plan for each extra work area with a less than 50-foot setback from wetland boundaries (except where adjacent upland consists of actively cultivated or rotated cropland or other disturbed land) and a site-specific explanation of the conditions that will not permit a 50-foot setback.

c. Limit clearing of vegetation between extra work areas and the edge of the wetland to the certificated construction right-of-way.

d. The construction right-of-way may be used for access when the wetland soil is firm enough to avoid rutting or the construction right-of-way has been appropriately stabilized to avoid rutting (e.g., with timber riprap, prefabricated equipment mats, or terra mats).

In wetlands that cannot be appropriately stabilized, all construction equipment other than that needed to install the wetland crossing shall use access roads located in upland areas. Where access roads in upland areas do not provide reasonable access, limit all other construction equipment to one pass through the wetland using the construction right-of-way.

e. The only access roads, other than the construction right-of-way, that can be used in wetlands without Director approval, are those existing roads that can be used with no modification and no impact on the wetland.

2. Crossing Procedures

   a. Comply with COE, or its delegated agency, permit terms and conditions

   b. Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe.

   c. Use "push-pull" or "float" techniques to place the pipe in the trench where water and other site conditions allow.

   d. Minimize the length of time that topsoil is segregated and the trench is open.

   e. Limit construction equipment operating in wetland areas to that needed to clear the construction right-of-way, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction right-of-way.

   f. Cut vegetation just aboveground level, leaving existing root systems in place, and remove it from the wetland for disposal.

g. Limit pulling of tree stumps and grading activities to directly over the trenchline. Do not grade or remove stumps or root systems from the rest of the construction right-of-way in wetlands unless the Chief Inspector and Environmental Inspector determine that safety-related construction constraints require grading or the removal of tree stumps from under the working side of the construction right-of-way.

h. Segregate the top 1 foot of topsoil from the area disturbed by trenching, except in areas where standing water is present or soils are saturated or frozen. Immediately after backfilling is complete, restore the segregated topsoil to its original location.

i. Do not use rock, soil imported from outside the wetland, tree stumps, or brush riprap to support equipment on the construction right-of-way.

j. If standing water or saturated soils are present, or if construction equipment causes ruts or mixing of the topsoil and subsoil in wetlands, use low-ground-weight construction equipment, or operate normal equipment on timber riprap, prefabricated equipment mats, or terra mats.

k. Do not cut trees outside of the approved construction work area to obtain timber for riprap or equipment mats.

l. Attempt to use no more than two layers of timber riprap to support equipment on the construction right-of-way.

m. Remove all project-related material used to support equipment on the construction right-of-way upon completion of construction.

3. Temporary Sediment Control

Install sediment barriers (as defined in section IV.F.2.a. of the Plan) immediately after initial disturbance of the wetland or adjacent upland. Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench). Except as noted below in section VI.B.3.c., maintain sediment barriers until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in the Plan.

a. Install sediment barriers across the entire construction right-of-way at all wetland crossings where necessary to prevent sediment flow into the wetland. In the travel lane, these may consist of removable sediment barriers or driveable berms. Removable sediment barriers can be removed during the construction day, but must be re-installed after construction has stopped for the day and/or when heavy precipitation is imminent

b. Where wetlands are adjacent to the construction right-of-way and the right-of-way slopes toward the wetland, install sediment barriers along the edge of the construction right-of-way as necessary to prevent sediment flow into the wetland.

c. Install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil and sediment within the construction right-of-way through wetlands. Remove these sediment barriers during right-of-way cleanup.

4. Trench Dewatering

Dewater the trench (either on or off the construction right-of-way) in a manner that does not cause erosion and does not result in heavily silt-laden water flowing into any wetland. Remove the dewatering structures as soon as possible after the completion of dewatering activities.

## C. RESTORATION

1. Where the pipeline trench may drain a wetland, construct trench breakers and/or seal the trench bottom as necessary to maintain the original wetland hydrology.

2. For each wetland crossed, install a trench breaker at the base of slopes near the boundary between the wetland and adjacent upland areas. Install a permanent slope breaker across the construction right-of-way at the base of a slopes greater than 5 percent where the base of the slope is less than 50 feet from the wetland, or as needed to prevent sediment transport into the wetland. In addition, install sediment barriers as outlined in the Plan. In some areas, with the approval of the Environmental Inspector, an earthen berm may be suitable as a sediment barrier adjacent to the wetland.

3. Do not use fertilizer, lime, or mulch unless required in writing by the appropriate land management or state agency.

4. Consult with the appropriate land management or state agency to develop a project-specific wetland restoration plan. The restoration plan should include measures for re-establishing herbaceous and/or woody species, controlling the invasion and spread of undesirable exotic species (e.g., purple loosestrife and phragmites), and monitoring the success of the revegetation and weed control efforts. Provide this plan to the FERC staff upon request.

5. Until a project-specific wetland restoration plan is developed and/or implemented, temporarily revegetate the construction right-of-way with annual ryegrass at a rate of 40 pounds/acre (unless standing water is present).

6. Ensure that all disturbed areas successfully revegetate with wetland herbaceous and/or woody plant species.

7. Remove temporary sediment barriers located at the boundary between wetland and adjacent upland areas after upland revegetation and stabilization of adjacent upland areas are judged to be successful as specified in section VII.A.5. of the Plan.

## D. POST-CONSTRUCTION MAINTENANCE

1. Do not conduct vegetation maintenance over the full width of the permanent right-of-way in wetlands. However, to facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be maintained in a herbaceous state. In addition, trees within 15 feet of the pipeline that are greater than 15 feet in height may be selectively cut and removed from the permanent right-of-way.

2. Do not use herbicides or pesticides in or within 100 feet of a wetland, except as allowed by the appropriate land management agency or state agency.

3. Monitor and record the success of wetland revegetation annually for the first 3 years after construction or until wetland revegetation is successful. At the end of 3 years after construction, file a report with the Secretary identifying the status of the wetland revegetation efforts. Include the percent cover achieved and problem areas (weed invasion issues, poor revegetation, etc.). Continue to file a report annually until wetland revegetation is successful.

4. Wetland revegetation shall be considered successful if the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent wetland areas that were not disturbed by construction. If revegetation is not successful at the end of 3 years, develop and implement (in consultation with a professional wetland ecologist) a remedial revegetation plan to actively revegetate the wetland. Continue revegetation efforts until wetland revegetation is successful.

## VII. HYDROSTATIC TESTING

### A. NOTIFICATION PROCEDURES AND PERMITS

1. Apply for state-issued water withdrawal permits, as required.

2. Apply for National Pollutant Discharge Elimination System (NPDES) or state-issued discharge permits, as required.

3. Notify appropriate state agencies of intent to use specific sources at least 48 hours before testing activities unless they waive this requirement in writing.

### B. GENERAL

1. Perform non-destructive testing of all pipeline section welds or hydrotest the pipeline sections, before installation under waterbodies or wetlands.

2. If pumps used for hydrostatic testing are within 100 feet of any waterbody or wetland, address the operation and refueling of these pumps in the project's Spill Prevention and Response Procedures.

3. The project sponsor shall file with the Secretary before construction a list identifying the location of all waterbodies proposed for use as a hydrostatic test water source or discharge location.

### C. INTAKE SOURCE AND RATE

1. Screen the intake hose to prevent entrainment of fish.

2. Do not use state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate Federal, state, and/or local permitting agencies grant written permission.

3. Maintain adequate flow rates to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users.

4. Locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable.

## D. DISCHARGE LOCATION, METHOD, AND RATE

1. Regulate discharge rate, use energy dissipation device(s), and install sediment barriers, as necessary, to prevent erosion, streambed scour, suspension of sediments, or excessive streamflow.
2. Do not discharge into state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate Federal, state, and local permitting agencies grant written permission.

Spectra Energy

# *Appendix D – Algonquin Erosion & Sedimentation Control Plan*

# EROSION AND SEDIMENTATION CONTROL PLAN

*Company:* Algonquin Gas Transmission, LLC

*Project:* **Algonquin J-2 Loop Project**

*Location:* **Medford and Somerville, Massachusetts**

*Prepared by:*
Environmental Construction Permitting
5400 Westheimer Court, SP-777
Houston, Texas 77056-5310

Effective January 17, 2003

## TABLE OF CONTENTS

Page

1. INTRODUCTION 1-1
    - 1.1 Purpose of this Plan 1-1
    - 1.2 Guidelines and Requirements 1-1
    - 1.3 Surveys, Permits, and Notifications 1-2
    - 1.4 Inquiries 1-2

2. SUPERVISION AND INSPECTION 2-1
    - 2.1 Responsibilities of the Environmental Inspector 2-1
    - 2.2 Environmental Training for Construction 2-2

3. CONSTRUCTION TECHNIQUES FOR NATURAL GAS PIPELINES 3-1
    - 3.1 Typical ROW Requirements 3-1
    - 3.2 Access Roads 3-1
    - 3.3 Pipe and Contractor Wareyards 3-2
    - 3.4 Off-ROW Disturbance 3-3
    - 3.5 Construction Sequence 3-3
        - 3.5.1 Clearing 3-4
        - 3.5.2 Installing Temporary Sediment Barriers 3-5
        - 3.5.3 Grading 3-5
            - 3.5.3.1 Topsoil Segregation 3-5
            - 3.5.3.2 Tree Stump Removal and Disposal 3-6
            - 3.5.3.3 Rock Disposal 3-6
        - 3.5.4 Installing Temporary Interceptor Dikes 3-7
        - 3.5.5 Trenching 3-8
            - 3.5.5.1 Temporary Trench Plugs 3-8
        - 3.5.6 Trench Dewatering 3-8
        - 3.5.7 Pipe Installation 3-9
            - 3.5.7.1 Stringing and Bending 3-9
            - 3.5.7.2 Welding and Weld Inspection 3-9
            - 3.5.7.3 Lowering-in 3-9
        - 3.5.8 Backfilling 3-9
            - 3.5.8.1 Permanent Trench Plugs 3-10
        - 3.5.9 Hydrostatic Testing 3-10
    - 3.6 ROW Restoration and Final Cleanup 3-12
        - 3.6.1 Permanent Erosion Control 3-13
            - 3.6.1.1 Permanent Interceptor Dikes 3-13
            - 3.6.1.2 Erosion Control Fabric 3-13
        - 3.6.2 Revegetation and Seeding 3-14
        - 3.6.3 Mulch 3-15
        - 3.6.4 Winter Stabilization 3-15
    - 3.7 Unauthorized Vehicle Access to ROW 3-16

4. **SPECIAL CONSTRUCTION METHODS** **4-1**
- 4.1 Agricultural Areas 4-1
  - 4.1.1 Drain Tiles 4-1
  - 4.1.2 Irrigation 4-1
  - 4.1.3 Soil Compaction Mitigation 4-1
- 4.2 Road Crossings 4-2
- 4.3 Residential Areas 4-2
  - 4.3.1 Construction Procedures 4-2
  - 4.3.2 Construction Techniques 4-2
  - 4.3.3 Cleanup and Restoration 4-3

5. **WATERBODY CROSSINGS** **5-1**
- 5.1 Waterbody Definitions 5-1
- 5.2 General Waterbody Procedures 5-1
  - 5.2.1 Time Window for Construction 5-2
  - 5.2.2 Temporary Equipment Bridges 5-2
  - 5.2.3 Clearing and Grading 5-3
  - 5.2.4 Installing Temporary Erosion and Sediment Control 5-3
  - 5.2.5 Various Types of Crossings 5-4
    - 5.2.5.1 General Crossing Procedures 5-4
    - 5.2.5.2 Flumed Crossing 5-5
    - 5.2.5.3 Dam and Pump Crossing 5-6
    - 5.2.5.4 Wet Crossing 5-7
  - 5.2.6 Restoration 5-8

6. **WETLAND CROSSINGS** **6-1**
- 6.1 Definition 6-1
- 6.2 General Procedures 6-1
  - 6.2.1 Clearing and Grading 6-1
  - 6.2.2 Temporary Erosion and Sediment Control 6-2
  - 6.2.3 Crossing Procedure 6-2
  - 6.2.4 Cleanup and Restoration 6-3

7. **SPILL PREVENTION CONTROL** **7-1**

8. **POST CONSTRUCTION ACTIVITIES** **8-1**
- 8.1 Post-Construction Monitoring 8-1
- 8.2 Post-Construction Maintenance 8-2
  - 8.2.1 Uplands 8-2
  - 8.2.2 Waterbodies and Wetlands 8-2
- 8.3 Reporting 8-3

## APPENDICES

### APPENDIX A – FIGURES

1 Typical Construction Widths Acquiring New Permanent Right-of-Way

2 Typical Construction Widths Not Acquiring New Permanent Right-of-Way (Multiple Line System)

3 Typical Construction Widths Not Acquiring New Permanent Right-of-Way (Single Line System)

4 Access Road Cross Section

5 Rock Access Pad Installation and Maintenance

6 Typical Temporary Access Road Through Wetlands

7 Silt Fence Installation and Maintenance

8 Straw Bale Installation and Maintenance

9 Straw Bale Installation for a Check Dam in a Drainage Way

10 Storm Drain Inlet Protection

11 ROW Topsoil Segregation Techniques

12 Interceptor Dike Installation and Maintenance

13 Typical Trench Detail

14 Temporary Trench Plugs

15 Filter Bag

16 Permanent Trench Plugs

17 Trench Plug Detail

18 Dewatering Structure for Hydrostatic Testing

19 Alternate Dewatering Structure for Hydrostatic Testing

20 Chevron Interceptor Dike Installation and Maintenance

21 Rock-Lined Drainage Swale Installation and Maintenance

22 Typical Matting on Slopes

23 Erosion Control Fabric Installation

## APPENDIX A – FIGURES (CONT.)

24 Drain Tile Repair Procedure

25 Typical Paved Road Crossing Control Measures (Open Cut)

26 Typical Paved Road Crossing Control Measures (Bored)

27 Temporary Equipment Bridge (Equipment Pads and Culverts)

28 Temporary Equipment Bridge (Crushed Stone and Culverts)

29 Temporary Equipment Bridge (Flexi-float or Portable Bridge)

30 Typical Flumed Crossing

31 Typical Dam and Pump Crossing

32 Typical Wet Crossing

33 Typical Matting of Streambanks

34 Rip Rap Replacement (Typical)

## APPENDIX B – SEED MIX RECOMMENDATIONS

# 1. INTRODUCTION

## 1.1 Purpose of this Plan

This Erosion and Sedimentation Control Plan (Plan) has been prepared for use by the Company and its contractors as a guidance manual for minimizing erosion of disturbed soils and transportation of sediments off the right-of-way (ROW) and into sensitive resources (wetlands, streams, and residential areas) during natural gas pipeline construction. The procedures developed in this Plan, which represent the Company's best management practices, are designed to accommodate varying field conditions while maintaining rigid minimum standards for the protection of environmentally sensitive areas.

This Plan is designed to provide specifications for the installation and implementation of soil erosion and sediment control measures while permitting adequate flexibility to use the most appropriate measures based on site-specific conditions. The intent of this Plan is to provide general information on the pipeline construction process and to describe specific measures that will be employed during and following construction to minimize impacts to the environment along the pipeline ROW.

The goal of this Plan is to preserve the integrity of environmentally sensitive areas and to maintain existing water quality by implementing the following objectives:

- Minimize the extent and duration of disturbance;
- Protect exposed soil by diverting runoff to stabilized areas;
- Install temporary and permanent erosion control measures; and
- Establish an effective inspection and maintenance program.

## 1.2 Guidelines and Requirements

The measures described in this Plan have been developed based on guidelines from the Federal Energy Regulatory Commission (FERC), United States Army Corps of Engineers (COE), the United States Fish and Wildlife Service (USF&W), the United States Department of Agriculture, and the Natural Resource Conservation Service, as well as from the Company's significant experience and practical knowledge of pipeline construction and effective environmental protection measures. Lessons and insights gained during pipeline construction projects along the Company's pipeline system and comments from agency representatives are also incorporated into this Plan.

Any deviation from the placement of the structures specified in the construction drawings, or changes in the design of control measures as set forth in this Plan, must be approved by the Company's Environmental Construction Permitting Department and must have the concurrence from the appropriate permitting agency.

Pursuant to changes in the FERC regulations, interstate pipeline companies are now required to comply with the FERC's Upland Erosion Control, Revegetation, and Maintenance Plan and the FERC's Wetland and Waterbody Construction and Mitigation Procedures (Plan and Procedures. 1/17/2003 Version), unless approval to deviate from the Plan and Procedures is received from the appropriate state agency.

The following identifies the differences between this Plan and the FERC's Plan and Procedures as well as the reasons behind the differences:

1. FERC Plan (Section V.C.1 and V.C.3): Perform compaction testing in residential areas disturbed by construction activities and perform appropriate soil compaction mitigation in severely compacted residential areas.

   This Plan: Compaction testing and mitigation are not required in residential areas.

   Reason to Deviate: This Plan requires that topsoil either be segregated or replaced in residential areas. Topsoil that is segregated or replaced results in little compaction and provides a suitable medium for grass. Most yard areas that are sown in grass do not require deep root penetration. In the event that the grass needs deeper root penetration, the subsequent freeze-thaw cycles of the upper portions of the subsoil will provide natural mitigation of any compacted areas of the ROW within 2-3 years. Post-construction monitoring will be conducted during this timeframe as discussed in Section 8.1.

## 1.3 Surveys, Permits, and Notifications

The Company shall perform the required environmental field surveys and acquire the necessary environmental permits prior to start of construction of the project. The Company shall notify the appropriate federal and state agencies prior to, during, and/or subsequent to the construction of the project, as identified in the Clearance Package/ Permit Book.

## 1.4 Inquiries

Inquiries regarding this Plan should be addressed to the Manager, Environmental Construction Permitting Department; shown on the front cover; P.O. Box 1642; Houston, Texas 77056. For field conditions requiring an immediate response, contact the Area Manager at the address shown on the front cover.

# 2. SUPERVISION AND INSPECTION

To effectively mitigate project-related impacts, the Plan must be properly implemented in the field. Quick and appropriate decisions in the field regarding critical issues such as stream and wetland crossings, placement of erosion controls, trench dewatering, spoil containment, and other construction related items are essential.

To ensure that the Plan is properly implemented, at least one Environmental Inspector (EI) will be designated by the Company for each construction spread during active construction or restoration. The EI will have peer status with all other activity inspectors and will report directly to the Resident Engineer/ Chief Inspector who has overall authority on the construction spread. On smaller projects, the EI role may be carried out by the Resident Engineer/ Chief Inspector or a Craft Inspector, as designated by the Company. The EI will have the authority to stop activities that violate the environmental conditions of the FERC certificate (if applicable), other federal and state permits, or landowner requirements, and to order corrective action.

## 2.1 Responsibilities of the Environmental Inspector

At a minimum, the EI shall be responsible for:

1. Ensuring compliance with the requirements of this Plan, the construction drawings, the environmental conditions of the FERC certificate (if applicable), proposed mitigation measures, other federal or state environmental permits and approvals, and environmental requirements in landowner easement agreements;
2. Identifying, documenting, and overseeing corrective actions, as necessary to bring an activity back into compliance;
3 Verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing;
4 Verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;
5 Identifying erosion/sediment control and stabilization needs in all areas;
6 Identifying locations for dewatering structures and interceptor dikes to ensure they will not direct water into known cultural resources sites or locations of sensitive resources;
7 Verifying that trench-dewatering activities do not result in the deposition of sand, silt, and/or sediment near the point of discharge into a wetland or waterbody. If such deposition is occurring, the dewatering activity shall be stopped. The design of the discharge shall be changed by the EI to prevent reoccurrence;
8 Ensuring that subsoil and topsoil are tested in agricultural areas to measure compaction and determine the need for corrective action;

9 Advising the Chief Inspector when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive rutting;

10 Ensuring restoration of contours and topsoil;

11 Verifying that the soils imported for agricultural or residential use have been certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner;

12 Determining the need for and ensuring that erosion controls are properly installed and maintained, daily if necessary; to prevent sediment flow into wetlands, waterbodies, sensitive areas, and onto roads;

13 Inspecting temporary erosion control measures at least:

   a. On a daily basis in areas of active construction or equipment operation;
   b. On a weekly basis in areas with no construction or equipment operation; and
   c. Within 24 hours of each 0.5 inch of rainfall.

14 Ensuring the repair of all ineffective temporary erosion control measures within 24 hours of identification;

15 Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase;

16 Ensuring that the Contractor implements and complies with the Company's Spill Prevention Control and Countermeasure (SPCC) Plan; and

17 Keeping records of compliance with the environmental conditions of the FERC certificate (if applicable), proposed mitigation measures, and other Federal or state environmental permits during active construction and restoration.

## 2.2 Environmental Training for Construction

If required by the FERC certificate, environmental training will be given to both the Company personnel and contractor personnel whose activities will impact the environment during pipeline construction. The level of training will be commensurate with the type of duties of the personnel. All construction personnel from the chief inspector, EI, craft inspectors, contractor job superintendent to loggers, welders, equipment operators, and laborers will be given some form of environmental training. In addition to the EI, all other construction personnel are expected to play an important role in maintaining strict compliance with all permit conditions to protect the environment during construction. Training will be given prior to the start of construction and throughout the construction process, as needed, and will cover the following issues:

- The specifics of this Plan and the SPCC Plan;
- Job or activity specific permit requirements;
- Company policies and commitments;
- Cultural resource procedures and restrictions;

- Threatened and endangered species restrictions; and
- Any other pertinent information related to the job.

# 3. CONSTRUCTION TECHNIQUES FOR NATURAL GAS PIPELINES

## 3.1 Typical ROW Requirements

Pipeline construction workspace requirements are a function of pipe diameter, equipment size, topography, geological rock formations, location of construction such as at road crossings or river crossings, pipeline crossovers, methods of construction such as boring or open-cut construction, or existing soil conditions encountered during construction. As the diameter of the pipeline being installed increases, so does the depth of trench, excavated spoil material, equipment size, and ultimately the amount of construction work space that will be required to construct the project. All construction activities are restricted to the ROW limits identified on the construction drawings. However, in limited, non-wetland areas, the construction ROW width may be expanded by up to 25 feet without approval from the FERC for the following situations:

1. To accommodate full construction ROW topsoil segregation;
2. To ensure safe construction where topographic conditions (i.e., side-slopes) or soil limitations exist; and
3. For truck turn-arounds where no reasonable alternative access exits in limited, non-wetland or non-forested areas.

Use of these limited areas is subject to landowner approval and compliance with all applicable survey, mitigation, and reporting requirements.

The U.S. Department of Transportation (DOT) and Occupational Safety and Health Administration (OSHA) have established minimum size and area requirements for worker safety involving construction activities. See Figures 1, 2, and 3 for typical construction ROW widths. Additional construction ROW may be required at specific locations to construct a pipeline including, but not limited to, steep side or vertical slopes, road crossings, crossovers, areas requiring topsoil segregation, and staging areas associated with wetland and waterbody crossings. These locations are shown on the construction drawings.

## 3.2 Access Roads

All access to the construction ROW will be limited to existing roads and minimized in wetlands to the extent practical. Additional access roads to the ROW are required at various points along the project ROW where other road crossings (paved or gravel/state/local roads) do not exist. Examples of types of access used include abandoned town roads, railroad ROWs, powerline service roads, logging roads and farm roads. Improvements to access roads (i.e., grading, placing gravel, replacing/installing culverts, and trimming overhanging vegetation) may be required due to the size and nature of the equipment that would utilize the road (Figure 4).

1. Access to the ROW during construction and restoration activities is permitted only by the new or existing access roads identified on the construction drawings.

2. Contractor shall maintain safe conditions at all road crossings and access points during construction and restoration. All access roads will be maintained during construction by grading and the addition of gravel or stone when necessary.

3. Contractor will implement all appropriate erosion and sedimentation control measures for construction/improvement of access roads.

4. Contractor shall ensure that all paved road surfaces utilized during construction are kept free of mud and debris to the extent practical.

5. If rock access pads are required by the permitting agencies in residential or active agricultural areas, rock shall be placed on nonwoven geotextile fabric to facilitate rock removal after construction (Figure 5).

6. All access roads across a waterbody must use an equipment bridge in accordance with Section 5.2.2.

7. The only access roads, unless otherwise permitted, that can be used in wetlands other than the construction ROW are those existing roads requiring no modification and no impact on the wetland.

8. Limit construction equipment operating in wetland areas to that needed to clear the ROW, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the ROW. All other construction equipment shall use access roads located in upland areas to the maximum extent practical. Where access roads in upland areas do not provide reasonable access, limit all other construction equipment to one pass through the wetland using the ROW, whenever practical.

9. For access through a saturated wetland, unless otherwise authorized by agency permits, use timber mats or an equivalent (Figure 6).

## 3.3 Pipe and Contractor Wareyards

Pipe and contractor wareyards are required for storing and staging equipment, pipe, fuel, oil, pipe fabrication, and other construction related materials. The Contractor shall perform the following measures at pipe and contractor wareyards:

1. Strip and segregate topsoil in agricultural lands;

2. Install erosion control structures as directed by the EI, outlined in this Plan, or identified on the construction drawings, and maintain them throughout construction and restoration activities;

3. Implement and comply with the SPCC Plan; and

4. Restore and revegetate all disturbed areas in accordance with the measures outlined in this Plan and as directed by the EI.

## 3.4 Off-ROW Disturbance

With certain exceptions, which are required in order to comply with FERC Plan and Procedures, all construction activities are restricted to within the limits identified on the construction drawings (exceptions include the installation of slope breakers, installation of energy-dissipating devices, installation of dewatering structures, and drain tile repair which are subject to applicable survey requirements). However, in the event that off-ROW disturbance occurs, the following measures will be implemented:

1. The EI will immediately report the occurrence to the Chief Inspector and ROW Agent;

2. The conditions that caused the disturbance will be evaluated by the Chief Inspector and the EI, and they will determine whether work at the location can proceed under those conditions; and

3. If deemed necessary by the Chief Inspector and EI, one or more of the following corrective actions will be taken: immediate restoration of the original contours, seeding and mulching of the disturbed area, and/or installation of erosion control devices. The Company's Environmental Construction Permitting Department will be notified as soon as practical.

## 3.5 Construction Sequence

Natural gas pipelines are installed using conventional overland buried pipeline construction techniques. These activities are necessary for the installation of a stable, safe, and reliable transmission facility consistent with DOT requirements and regulations. This section provides an overview of the equipment and operations necessary for the installation of a natural gas pipeline, describes potential impacts that may occur from each operation, and identifies the measures that will be implemented to control these potential impacts. This section also discusses in detail the erosion and sediment control techniques that apply to each construction activity including clearing, grading, trenching, lowering-in of pipe, backfilling, and hydrostatic testing. ROW restoration will be addressed in Section 3.6.

Installation of the pipeline will typically proceed from one end of the construction spread to the other in an assembly line or "mainline" fashion. The spacing between the individual crews responsible for each interdependent activity is based on anticipated rate of progress. The activities listed below are normally performed in the following sequence:

- Survey and Flag the ROW;
- Clearing the ROW;
- Installing temporary sediment barriers;
- Grading the ROW;
- Installing temporary interceptor dikes;
- Trenching/excavating the trench;
- Pipe stringing and bending;

- Welding and weld inspection;
- Trench dewatering;
- Lowering the pipe into the trench;
- Backfilling the trench;
- Hydrostatic testing of pipe; and
- ROW restoration and clean-up.

Obstacles to the mainline technique are often encountered and are not considered to be out of the ordinary. These obstacles, which include side hill crossings, rock, wetlands, streams, roads, and residential areas, do not normally interrupt the assembly line flow.

### *3.5.1 Clearing*

- Clearing operations will include the removal of vegetation within the construction ROW. Various clearing methods will be employed depending on tree size, contour of the land, and the ability of the ground to support clearing equipment. Vegetative clearing will either be accomplished by hand or by cutting equipment. The following procedures will be standard practice during clearing:

1. Prior to beginning the removal of vegetation, the limits of clearing will be established and identified in accordance with the construction drawings;

2. All construction activities and ground disturbance will be confined to within the ROW shown on the construction drawings;

3. Clearly mark and protect trees to be saved as per landowner requests or as otherwise required;

4. All brush and trees will be felled into the construction ROW to minimize damage to trees and structures adjacent to the ROW. Trees that inadvertently fall beyond the edge of the ROW will be immediately moved onto the ROW and disturbed areas will be immediately stabilized;

5. Trees will be chipped or cut into lengths identified by the landowner and then stacked at the edge of the ROW or removed;

6. Brush and limbs may be disposed of in one or more of the following ways depending on local restrictions, applicable permits, construction Line List stipulations, and landowner agreements:

   a. Stockpiled along the edge of the ROW;
   b. Burned;
   c. Chipped, spread across the ROW in upland areas, and plowed in; or
   d. Hauled off site.

7. Existing surface drainage patterns will not be altered by the placement of timber or brush piles at the edge of the construction ROW.

### *3.5.2 Installing Temporary Sediment Barriers*

Sediment barriers, which are temporary erosion controls intended to minimize the flow of sediment and to prevent the deposition of sediments into sensitive resources, shall be installed following vegetative clearing operations. They may be constructed of materials such as silt fence, staked straw bales, compacted earth (e.g., drivable berms across travel lanes), sandbags, or an equivalent material as identified by the EI (Figures 7, 8, 9, 10). Hay bales may be used in lieu of straw bales with the following restrictions – hay bales shall not be used for mulching and the Contractor is responsible for their removal and disposal.

1. Install temporary sediment barriers at the base of slopes adjacent to road crossings and at waterbody and wetland crossings in accordance with Sections 5.2.4 and 6.2.2 respectively.

2. Do not stake or trench in place straw bales used on equipment bridges or on mats across the travel lane.

3. Inspect temporary sediment barriers daily in areas of active construction to ensure proper functioning and maintenance. In other areas, sediment barriers will be inspected and maintained on a weekly basis throughout construction, and within 24 hours following storm events.

4. Maintain all temporary sediment barriers in place until permanent revegetation measures are successful or the upland areas adjacent to wetlands, waterbodies, or roads are stabilized.

5. Remove temporary sediment barriers from an area when replaced by permanent erosion control measures or when the area has been successfully restored as specified in Section 8.1.

### *3.5.3 Grading*

The construction ROW will be graded as needed to provide a level workspace for safe operation of heavy equipment used in pipeline construction. The following procedures will be standard practice during grading:

#### ***3.5.3.1 Topsoil Segregation***

Topsoil segregation methods will be used in all residential areas and when the construction ROW is wider than 30 feet in annually cultivated or rotated agricultural lands, cultivated pastures, hayfields, and other areas at the landowner's or land managing agency's request.

a. Prevent the mixing of topsoil with subsoil by stripping topsoil from either the full work area or from the trench line and subsoil storage area (ditch plus spoil side method) as stipulated in the Construction Contract or Line List (Figure 11).

b. Segregate at least 12 inches of topsoil in deep soils with more than 12 inches of topsoil. In soils with less than 12 inches of topsoil, make every effort to segregate the entire topsoil layer.

c. Where topsoil segregation is required, maintain separation of salvaged topsoil and subsoil throughout all construction activities.

d. For wetlands, segregate the top 12 inches of topsoil within the ditchline, except in areas where standing water is present or soils are saturated or frozen.

e. Leave gaps in the topsoil piles for the installation of temporary interceptor dikes to allow water to be diverted off ROW.

f. Topsoil replacement (i.e., importation of topsoil) may be used as an alternative to topsoil segregation if approved by the landowner and Chief Inspector.

g. Never use topsoil for padding, backfill or trench plugs.

#### *3.5.3.2 Tree Stump Removal and Disposal*

a. Remove tree stumps in upland areas along the entire width of the permanent ROW to allow adequate clearance for the safe operation of vehicles and equipment. Stumps within the temporary ROW will be removed or ground to a suitable height that will allow the safe passage of equipment, as stipulated by the Chief Inspector or EI.

b. Dispose of stumps by one of the following methods, pending approval by the Chief Inspector and the landowner, and in accordance with regulatory requirements:

  - Buried at a Company-approved off-site location (except in wetlands and agricultural areas);
  - Burned;
  - Chipped, spread across the ROW in upland areas, and plowed in; or
  - Ground to grade in wetlands, excess chips will be removed for proper disposal.

c. Grading operations and tree stump removal in wetland areas will be conducted in accordance with Section 6.2.1.

#### *3.5.3.3 Rock Disposal*

Rock (including blast rock) will be disposed of in one or more of the following ways:

a. Buried on the ROW or in approved construction work areas either in the ditchline or as fill during grade cut restoration in accordance with the Construction specifications. In cultivated/ agricultural lands, wetlands, and residential areas, rock may only be backfilled to the top of the existing bedrock profile;

b. Windrowed per written landowner agreement with the Company;

c. Removed and disposed of at a Company-approved site; or

d. Used as riprap for stream bank stabilization where allowed by an applicable regulatory agency(s) (Figure 34).

### *3.5.4 Installing Temporary Interceptor Dikes*

1. Temporary interceptor dikes, which are temporary erosion control measures intended to reduce runoff velocity and divert water off the construction ROW, shall be installed following grading operations (Figure 12). The interceptor dikes are to be installed on all disturbed areas as necessary to avoid excessive erosion. Temporary interceptor dikes may be constructed of materials such as compacted soil, silt fence, staked straw bales, or sand bags. Hay bales may be used in lieu of straw bales with the following restrictions – hay bales shall not be used for mulching and the Contractor is responsible for their removal and disposal.

   Temporary slope breakers must be installed on slopes greater than 5 percent where the base of the slope is less than 50 feet from waterbody, wetland or road crossing at the spacing indicated below (closer spacing should be used if necessary). Where the base of the slope is equal or greater than 50 feet from a waterbody, wetland, or road crossing, install interceptor dikes at a spacing necessary to avoid excessive erosion.

| **Slope (%)** | **Spacing (feet)** |
|---|---|
| <5 | No Structure |
| 5 - 15 | 300 |
| > 15 - 30 | 200 |
| > 30 | 100 |

2. Direct the outfall of each temporary interceptor dike to a stable, well vegetated area or construct an energy-dissipating device (silt fence, staked straw bales, erosion control fabric) at the end of the interceptor dike.

3. Position the outfall of each temporary interceptor dike to prevent sediment discharge into wetlands, waterbodies, or other sensitive resources.

4. Install temporary interceptor dikes across the entire ROW at all waterbody and wetland crossings, as well as the base of slopes adjacent to roads, when directed by the EI.

5. Drivable berms, which are smaller versions of interceptor dikes constructed of compacted soil or sand bags, may be used in place of staked straw bales at the entrances and exits of travel lanes at road crossings, waterbodies, and wetlands. They are installed the width of the travel lane at the start of the equipment crossing and made low enough to allow equipment and other vehicles to pass. Yet, they reduce and divert water runoff from sensitive environmental resources.

6. Inspect temporary interceptor dikes daily in areas of active construction to insure proper functioning and maintenance. In other areas, the interceptor dikes will be inspected and maintained on a weekly basis throughout construction, and within 24 hours following storm events.

### *3.5.5 Trenching*

The trench centerline will be staked after the construction ROW has been prepared. In general, a trench will be excavated to a depth that will permit burial of the pipe with a minimum of 3 feet of cover (Figure 13). Overland trenching may be accomplished using a conventional backhoe or a rotary wheel-ditching machine. In shale or rocky areas where the use of the wheel-ditching machine is limited, a tractor-drawn ripper will be employed to break and loosen hard substratum material. In areas where rock cannot be ripped, drilling and blasting may be required. A backhoe may then be used to remove rock and soil from the ditch.

The following procedures will be standard practice during ditching:

1. Flag drainage tiles damaged during ditching activities for repair; and
2. Place spoil at least 10 feet upgradient from the edge of waterbodies. Spoil will be contained with erosion and sedimentation control devices to prevent spoil materials or heavily silt-laden water from transferring into waterbodies and wetlands or off of the ROW.

#### *3.5.5.1 Temporary Trench Plugs*

Temporary trench plugs are barriers within the ditch that segment the continuous open trench. They typically consist of compacted subsoil or sandbags (soft) placed across the ditch or composed of unexcavated portions of the ditch (hard). Along steep slopes, they serve to reduce erosion and sedimentation in the trench and minimize dewatering problems at the base of slopes where sensitive environments such as waterbodies and wetlands are frequently located. In addition, they provide access across the trench for wildlife and livestock.

a. Do not use topsoil for installing temporary soft trench plugs.

b. Coordinate with the landowner to identify optimal locations for the placement of temporary hard trench plugs designed to provide access for livestock.

c. Temporary trench plugs may be used in conjunction with interceptor dikes to prevent water in the trench from overflowing into sensitive resource areas (Figure 14). Attempt to divert trench overflow to a well-vegetated off-ROW location or construct an energy-dissipating device.

### *3.5.6 Trench Dewatering*

Trench dewatering may be periodically required along portions of the proposed pipeline prior to and/or subsequent to installation of the pipeline to remove collected water from the trench.

1. Trench dewatering will be conducted (on or off the construction ROW) in such a manner that does not cause erosion and does not result in heavily silt-laden water flowing into any waterbody or wetland.

2. The intakes of the hoses used to withdraw the water from the trench will be elevated and screened to minimize pumping of deposited sediments.

3. Water may be discharged into areas where adequate vegetation is present adjacent to the construction ROW to function as a filter medium.

4. Where vegetation is absent or in the vicinity of waterbody/ wetland areas, water will be pumped into a filter bag (Figure 15) or through a structure composed of sediment barriers. When using filter bags, secure the discharge hose to the bag with a clamp.

5. Remove dewatering structures as soon as possible after the completion of dewatering activities.

### *3.5.7 Pipe Installation*

#### *3.5.7.1 Stringing and Bending*

Following trench excavation, pipe sections will be delivered to the construction site by truck or tracked vehicle, and strung out along the trench. Individual pipe sections will be placed on temporary supports or wooden skids and staggered to allow room for work on the exposed ends. Certain pipe sections will be bent, as necessary, to conform to changes in slope and direction of the trench.

#### *3.5.7.2 Welding and Weld Inspection*

Once the bending operation is complete, the pipe sections will be welded together on supports using approved welding procedures that comply with Company welding specifications. After welding, the welds will be inspected radiographically or ultrasonically to ensure their structural integrity.

#### *3.5.7.3 Lowering-in*

Lowering-in consists of placing the completed pipeline sections into the trench where a tie-in weld will be made. Lowering-in is usually accomplished with two or more sideboom tractors acting in unison and spaced so as not to buckle or otherwise damage the pipe. The pipeline will be lifted from the supports, swung out over the trench, and lowered directly into the trench. The equipment uses a "leap frogging" technique requiring sufficient area to safely move around other tractors within the construction ROW to gain an advanced position on the pipe.

### *3.5.8 Backfilling*

Backfilling consists of covering the pipe with the earth removed from the trench or with other fill material hauled to the site when the existing trench spoil is not adequate for backfill. Backfilling will follow lowering-in of the pipeline as close as is practical.

In areas where the trench bottom is irregularly shaped due to consolidated rock or where the excavated spoil materials are unacceptable for backfilling around the pipe, padding material may be required to prevent damage to the pipe. This padding material will generally consist of sand or screened spoil materials from trench excavation.

1. Under no circumstances shall topsoil be used as padding material.
2. Excess rock, including blast rock, may be used to backfill the trench to the top of the existing bedrock profile in accordance with Company specifications. Rock that is not used to backfill the trench will be treated as described in Section 3.5.3.3.
3. Any excess material will be spread within the ROW in upland areas and land contours will be roughed-in to match adjacent topography.
4. The trench may be backfilled with a crown over the pipe to compensate for compaction and settling. Openings will be left in the completed trench crown to restore pre-construction drainage patterns. Crowning shall not be used in wetland areas.

#### *3.5.8.1 Permanent Trench Plugs*

Permanent trench plugs are intended to slow subsurface water flow and erosion along the trench and around the pipe in sloping terrain (Figures 16, 17). Permanent trench plugs will be constructed with sand bags or an equivalent as identified in the permit requirements. On severe slopes greater than 30 percent, "Sakrete" may be used at the discretion of the Chief Inspector.

a. Topsoil shall not be used to construct trench plugs.

b. Permanent trench plugs, which are used in conjunction with interceptor dikes, shall be installed at the locations shown on the construction drawings or as determined by the EI. If not shown, use the following spacing:

| **Slope (%)** | **Spacing (feet)** |
|---|---|
| <5 | No Structure |
| 5 - 15 | 300 |
| > 15 - 30 | 200 |
| > 30 | 100 |

c. Trench plugs shall be installed at the base of slopes adjacent to waterbodies and wetlands, and where needed to avoid draining of a resource.

### *3.5.9 Hydrostatic Testing*

Once the pipeline is completed and before it is placed into service, it will be hydrostatically tested for structural integrity. Hydrostatic testing involves filling the pipeline with clean water and maintaining a test pressure in excess of normal operating pressures for a specified period of time (typically 8 hours). The testing procedure involves filling the pipeline with test water, performing the pressure test, and discharging the test water.

1. The EI shall notify appropriate state agencies (as identified in the Hydrostatic Test Package) of the intent to use specific test water sources at least 48 hours before testing activities (unless waived in writing).

2. Pumps used for hydrostatic testing within 100 feet of any waterbody or wetland shall be operated and refueled in accordance with the SPCC Plan.

3. Do not use state-designated exceptional value waters, waterbodies that provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and/or local permitting agencies grant written permission. Use only the water sources identified in the Clearance Package/Permit Book.

4. Screen the intake hose to prevent entrainment of fish and other aquatic life.

5. Maintain ambient, downstream flow rates to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users.

6. Locate hydrostatic test manifolds outside wetlands and riparian areas to the greatest extent practical.

7. For an overland discharge of test water from a new pipeline, dewater into an energy dissipation device constructed of straw bales (Figures 18, 19).

8. For an overland discharge of test water from an existing pipeline, dewater into an energy dissipation device constructed of straw bales and absorbent booms (Figure 18). If required by the appropriate permitting agency, the test water may be discharged through an appropriate filtration system including frac tanks and/ or carbon filters.

9. Dewater only at the locations shown on the construction drawings or locations identified in the Hydrostatic Test Package.

10. Locate all dewatering structures in a well-vegetated and stabilized area, if practical, and attempt to maintain at least a 50-foot vegetated buffer from adjacent waterbody/wetland areas. If an adequate buffer is not available, sediment barriers or similar erosion control measure must be installed.

11. Regulate discharge rate, use energy dissipation device(s), and install sediment barriers, as necessary, to prevent erosion, streambed scour to aquatic resources, suspension of sediments, flooding or excessive stream flow.

12. Do not discharge into state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and local permitting agencies grant written permission.

13. The EI shall sample and test the source water and discharge water in accordance with the permit requirements.

## 3.6 ROW Restoration and Final Cleanup

Restoration of the ROW will begin after pipeline construction activities have been completed. Restoration measures include the re-establishment of final grades and drainage patterns as well as the installation of permanent erosion and sedimentation control devices to minimize post-construction erosion. Residential areas will be restored in accordance with Section 4.3.3. Property shall be restored as close to its original condition as practical unless otherwise specified by the landowner.

1. The Contractor shall make every reasonable effort to complete final cleanup of an area (including final grading and installation of permanent erosion control structures) within 20 days after backfilling the trench in that area (within 10 days in residential areas). If seasonal or other weather conditions prevent compliance with these time frames, maintain temporary erosion controls (temporary interceptor dikes and sediment barriers) until conditions allow completion of cleanup.

2. The disturbed ROW will be seeded within 6 working days of final grading, weather and soil conditions permitting.

3. If final cleanup and seeding cannot be completed and is delayed until the next recommended growing season, the winter stabilization measures in Section 3.6.4 shall be followed.

4. Grade the ROW to pre-construction contours.

5. Spread segregated topsoil back across the graded ROW to its original profile.

6. Remove excess rock from at least the top 12 inches of soil to the extent practical in all rotated and permanent cropland, hayfields, pastures, residential areas, and other areas at the landowner's request. The size, density, and distribution of rock on the construction ROW should be similar to adjacent areas not disturbed by construction. The landowner may approve other provisions in writing.

7. A travel lane may be left open temporarily to allow access by construction traffic if the temporary erosion control structures are installed, regularly inspected and maintained. When access is no longer required, the travel lane must be removed and the ROW restored.

8. Remove all construction debris (used filter bags, skids, trash, etc.) from the ROW unless the landowner or land managing agency approves otherwise. Grade or till the ROW to leave the soil in the proper condition for planting.

### *3.6.1 Permanent Erosion Control*

#### ***3.6.1.1 Permanent Interceptor Dikes***

Permanent interceptor dikes are intended to reduce runoff velocity, divert water off the construction ROW, and prevent sediment deposition into sensitive resources (Figure 12). Permanent interceptor dikes will be constructed of compacted soil. Sand bags or some functional equivalent may be used when directed by the EI.

a. Install permanent interceptor dikes in all areas, except cultivated areas and lawns, at the locations shown on the construction drawings or as directed by the EI. If not shown, use the spacing outlined for temporary interceptor dike installation in Section 3.5.4.

b. Install permanent interceptor dikes across the entire ROW at all waterbody and wetland crossings, and at the base of slopes adjacent to roads. When the ROW parallels an existing utility ROW, permanent interceptor dikes may be installed to match existing interceptor dikes on the adjacent undisturbed pipeline ROW.

c. Construct interceptor dikes with a 2 to 8 percent outslope to divert surface flow to a stable vegetative area without causing water to pool or erode behind the interceptor dike. In the absence of a stable vegetative area, install an energy-dissipating device at the end of the interceptor dike (Figure 12).

d. Interceptor dikes may extend slightly (about 4 feet) beyond the edge of the construction ROW to effectively drain water off the disturbed area. Where interceptor dikes extend beyond the edge of the construction ROW, they are subject to compliance with all applicable survey requirements.

e. Install chevron-style interceptor dikes on slopes when directed by the EI (Figure 20).

f. Install a rock-lined drainage swale along the ROW with restricted drainage features when directed by the EI. The drainage swale is generally 8 feet wide and a maximum of 18-24 inches deep (Figure 21).

g. On slopes greater than 30 percent, install interceptor dikes with erosion control fabric on the swale side.

#### ***3.6.1.2 Erosion Control Fabric***

a. Install erosion control fabric at interceptor dike outlets and drainage swales as necessary or as directed by the EI (Figure 12, 21).

b. Install erosion control fabric or matting on slopes greater than 30 percent adjacent to roads or waterbodies (Figure 22). Anchor the erosion control fabric or matting with staples or other appropriate devices in accordance with the manufacturers' recommendations.

c. The EI will direct the installation of high-velocity erosion control fabric on the swale side of permanent interceptor dikes (Figure 23).

### *3.6.2 Revegetation and Seeding*

Successful revegetation of soils disturbed by project-related activities is essential. Seeding will be conducted using the following requirements:

1. Fertilize and add soil pH modifiers in accordance with the recommendations in Appendix B. Incorporate recommended soil pH modifier and fertilizer into the top 2 inches of soil as soon as practical after application;

2. Seed all disturbed areas within 6 working days of final grading, weather and soil conditions permitting;

3. Prepare seedbed in disturbed areas to a depth of 3 to 4 inches to provide a firm seedbed. When hydroseeding, scarify the seedbed to facilitate lodging and germination of seed;

4. Seed disturbed areas in accordance with the seed mixes, rates, and dates in Appendix B, except in upland areas where landowners or a land management agency may request alternative seed mixes. Seeding is not required in actively cultivated croplands unless requested by the landowner.

5. Perform seeding of permanent vegetation within the recommended seeding dates as outlined in Appendix B. If seeding cannot be done within those dates, use appropriate temporary erosion control measures discussed in Section 3.5.2 and perform seeding of permanent vegetation at the beginning of the next recommended seeding season. Mulch in accordance with Section 3.6.3. Lawns may be seeded on a schedule established with the landowner;

6. Base seeding rates on Pure Live Seed (PLS). Use seed within 12 months of seed testing;

7. Treat legume seed with an inoculant specific to the species using the manufacturer's recommended rate of inoculant appropriate for the seeding method (broadcast, drill, or hydroseeding); and

8. Uniformly apply and cover seed in accordance with Appendix B. In the absence of any recommendations from the local soil conservation authorities, landowner, or land managing agency to the contrary. A seed drill equipped with a cultipacker is preferred for application, but broadcast or hydroseeding can be used at double the recommended seeding rates. Where seed is broadcast, firm the seedbed with a cultipacker or roller after seeding. In rocky soils, or where site conditions may limit the effectiveness of this equipment, other alternatives may be appropriate (e.g., use of a chain drag) to lightly cover seed after application, as approved by the EI.

### *3.6.3 Mulch*

Mulch is intended to stabilize the soil surface and shall consist of weed-free straw or hay, wood fiber hydromulch, erosion control fabric, or some functional equivalent as approved by the EI and Chief Inspector. Hay shall not be used for mulch.

1. Mulch **before** seeding if:
    a. Final cleanup, including final grading and installation of permanent erosion control measures, is not completed in an area within 20 days after the trench in that area is backfilled (10 days in residential areas); or
    b. Construction or restoration activity is interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions.

    NOTE: When mulching before seeding, increase mulch application on all slopes within 100 feet of waterbodies and wetlands to a rate of 3 tons/acre of straw or equivalent.

2. Apply mulch on all slopes (except in actively cultivated cropland) concurrent with or immediately after seeding, where necessary, to stabilize the soil surface and to reduce wind and water erosion. Spread mulch uniformly over the ROW at a rate of 2 tons/acre of straw or equivalent.

3. Mulch with woodchips only under the following conditions with prior approval from the Chief Inspector or the EI:
    a. Do not use more than 1 ton/acre; and
    b. Add the equivalent of 11 lbs/acre available nitrogen (at least 50 % of which is slow release).

4. Ensure that mulch is anchored to minimize loss by wind and water. Anchoring may be achieved by wet soil conditions (when approved by the EI), mechanical means, or with liquid mulch binders.

5 When anchoring with liquid mulch binders, use rates recommended by the manufacturer. **Do not use liquid mulch binders within 100 feet of wetlands and waterbodies.**

6. Install and anchor erosion control fabric, such as jute thatching, or bonded fiber blankets, on waterbody banks at the time of final bank recontouring. Anchor the erosion control fabric with staples or other appropriate devices.

### *3.6.4 Winter Stabilization*

In the event that the final phases of construction occur too late in the year for cleanup activities to adequately proceed, the following procedures will be implemented along the disturbed ROW at those locations until final restoration measures can be completed. The Company will file for review and written approval from the FERC, a winterization plan if construction continues into the winter season where conditions could delay successful decompaction, topsoil replacement, or seeding until the following spring.

1. Install permanent interceptor dikes at specified intervals on all slopes, or as directed by the EI;
2. Install temporary sediment barriers adjacent to stream and wetland crossings, as well as other critical areas;
3. Seed and mulch the ROW and seed segregated topsoil piles in accordance with Appendix B; and
4. Remove flumes from waterbody crossings to reestablish natural stream flow.

## 3.7 Unauthorized Vehicle Access to ROW

The Company will offer to install and maintain measures to control unauthorized vehicle access to the ROW based on requests by the manager or owner of forested lands. These measures may include:

- Signs;
- Fences with locking gates;
- Slash and timber barriers, pipe barriers, or a line of boulders across the ROW; or
- Conifers or other appropriate shrubs with a mature height of 4 feet or less across the ROW.

# 4. SPECIAL CONSTRUCTION METHODS

The Company will utilize the following specialized construction procedures for agricultural areas, road crossings, and residential areas along the pipeline project. The project construction drawings, Line Lists, and Construction Contract will indicate the locations where specialized construction methods will be used.

## 4.1 Agricultural Areas

### *4.1.1 Drain Tiles*

1. Attempt to locate existing drain tiles and irrigation systems.
2. Develop procedures for constructing through drain tiled areas, maintaining irrigation systems during construction, and repairing drain tiles and irrigation systems after construction.
3. Engage qualified drain tile specialists, as needed, to conduct or monitor repairs to drain tile systems affected by construction. Use drain tile specialist from the project area, if available.
4. Probe all drainage tile systems within the area of disturbance to check for damage.
5. Repair damaged drain tiles to their original condition (Figure 24). Filter-covered drain tiles may not be used unless the local soil conservation authorities and the landowner agrees in writing prior to construction.
6. Ensure that the depth of cover over the new pipeline is sufficient to avoid interference with drain tile systems (existing or proposed). For adjacent pipeline loops in agricultural areas, install the new pipeline with at least the same depth of cover as the existing pipeline(s).

### *4.1.2 Irrigation*

1. Maintain water flow in crop irrigation systems, unless shutoff is coordinated with affected parties.
2. Repair any damage to the systems as soon as practical.

### *4.1.3 Soil Compaction Mitigation*

1. Test topsoil and subsoil for compaction at regular intervals in agricultural areas disturbed by construction activities. Conduct tests on the same soil type under similar moisture conditions in undisturbed areas to identify approximate preconstruction conditions. Use penetrometers or other appropriate devices to conduct tests.
2. Plow severely compacted agricultural areas with a paraplow or other deep tillage implement. In areas where topsoil has been segregated, plow the subsoil before replacing the segregated topsoil. Alternatively, make arrangements with the landowner to plant and plow under a "green manure" crop, such as alfalfa, to decrease soil bulk density and improve soil structure. If subsequent construction and cleanup activities result in further compaction, conduct additional tilling.

## 4.2 Road Crossings

Unpaved private and public roads supporting minimal traffic volumes are usually crossed by boring or by means of an open cut, if this method is approved by the owner or appropriate road management agency. An open cut crossing may involve closing the road to all traffic and constructing an adequate detour around the crossing area, or excavating one-half of the road at a time allowing through traffic to be maintained

(Figure 25). The trench for an open cut crossing is excavated with a backhoe or similar equipment, all backfill is compacted, and the road resurfaced. All state, national, and interstate highways as well as all railroads must be crossed by boring (Figure 26), unless the crossing permit allows an open cut crossing. Access roads shall be used in accordance with Section 3.2.

## 4.3 Residential Areas

### *4.3.1 Construction Procedures*

Specialized construction procedures will be utilized in areas of heavy residential or commercial/industrial congestion where residences or business establishments lie greater than 25 feet but less than 50 feet from the edge of the construction ROW.

1. Install safety fence at the edge of the construction ROW for a distance of 100 feet on either side of the residence or business establishment.

2. Attempt to maintain a minimum distance of 25 feet between any residence/business establishment and the edge of the construction work area for a distance of 100 feet on either side of the residence/business establishment.

3. Attempt to leave mature trees and landscaping intact within the construction work area unless the trees and landscaping interfere with the installation techniques or present unsafe working conditions.

### *4.3.2 Construction Techniques*

In addition to the previously identified specialized procedures, smaller "spreads" of labor and equipment, operating independent of the mainline work force, will utilize either the stove pipe or drag section pipeline construction techniques in those areas of congestion where a minimum distance of 25 feet cannot be maintained between the residence(or business establishment) and the edge of the construction work area. In no case shall the temporary work area be located within 10 feet of a residence unless the landowner agrees in writing, or the area is within the existing maintained ROW. The following techniques shall be utilized for a distance of 100 feet on either side of the residence or business establishment at the locations identified in the Construction Contract and/or Line List.

1. The stove pipe construction technique is a less efficient alternative to the mainline method of construction, typically used when the pipeline is to be installed in very close proximity to an

existing structure or when an open trench would adversely impact a commercial/industrial establishment. The technique involves installing one joint of pipe at a time whereby the welding, weld inspection, and coating activities are all performed in the open trench. At the end of each day after the pipe is lowered-in, the trench is backfilled and/or covered with steel plates or timber mats. The length of excavation performed each day cannot exceed the amount of pipe installed.

2. The drag section construction technique, while less efficient than the mainline method, is normally preferred over the stove pipe alternative. This technique involves the trenching, installation, and backfill of a prefabricated length of pipe containing several segments all in one day. At the end of each day after the pipe is lowered-in, the trench is backfilled and/or covered with steel plates or timber mats. Use of the drag section technique will typically require adequate staging areas outside of the residential and/or commercial/industrial congestion for assembly of the prefabricated sections.

### *4.3.3 Cleanup and Restoration*

1. Reseed all disturbed lawns with a seed mixture acceptable to landowner or comparable to the adjoining lawn.

2. Landowners shall be compensated for damages to ornamental shrubs and other landscape plantings based on the appraised value as set forth in the Guide for Plant Appraisal, authored by the Council of Tree and Landscape Appraisers (CTLA), 8th Edition and published in 1992 by the International Society of Arboriculture.

3. Landowners shall be compensated for damages in a fair and reasonable manner, and as specified in the damage provision within the controlling easement on each property.

# 5. WATERBODY CROSSINGS

The following section describes the construction procedures and mitigation measures that will be used for pipeline installations at waterbodies. The intent of these procedures is to minimize the extent and duration of project related disturbances within waterbodies.

## 5.1 Waterbody Definitions

The term "**waterbody**" as used in this Plan includes any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as ponds and lakes. In this Plan, waterbodies are characterized into three main categories depending on the width of the waterbody. The categories are as follows:

- A **"minor waterbody"** includes all waterbodies less than or equal to 10 feet wide at the water's edge at the time of construction.
- An "**intermediate waterbody"** includes all waterbodies greater than 10 feet wide but less than or equal to 100 feet wide at the water's edge at the time of construction.
- A "**major waterbody"** includes all waterbodies greater than 100 feet wide at the water's edge at the time of construction.
- A "**state designated waterbody**" includes all perennial waterbodies that support coldwater fisheries and warmwater fisheries considered significant by the state.
- A "**non-state designated waterbody**" includes intermittent drainage ditches, intermittent streams, and perennial warmwater streams **not** considered significant by the state.

The waterbody crossing procedures described in this Plan comply with the Section 404 Nationwide permit program terms and conditions (33 CFR Part 330).

## 5.2 General Waterbody Procedures

Pipeline construction across waterbody channels may result in short term water quality impacts. Decisions regarding waterbody crossing techniques will be based on agency consultations. Mobilization of construction equipment, trench excavation, and backfilling will be performed in a manner that will minimize the potential for erosion and sedimentation within the waterbody channel. Erosion control measures will be implemented to confine water quality impacts within the immediate construction area and to minimize impacts to downstream areas. The length of the crossing, the sensitivity of the area, existing conditions at the time of the crossing, and permit requirements will determine the most appropriate measures to be used.

### *5.2.1 Time Window for Construction*

1. Unless expressly permitted or further restricted by the appropriate state agency in writing on a site-specific basis, instream work, except that required to install or remove equipment bridges, must occur during the following time windows:
   a. Coldwater Fisheries – June 1 through September 30: and
   b. Coolwater and Warmwater Fisheries – June 1 through November 30.

### *5.2.2 Temporary Equipment Bridges*

A temporary equipment bridge is a structure that may be installed across a waterbody to provide a means for construction equipment to cross the stream while minimizing impacts to the channel bottom or banks.

1. Until the equipment bridge is installed, only clearing equipment and equipment necessary for installation of equipment bridges may cross the waterbody and the number of crossings shall be limited to one crossing per piece of equipment, unless otherwise authorized by the appropriate permitting agency.

2. Construct equipment bridges to maintain unrestricted flow and to prevent soil from entering the waterbody. Examples of such bridges include:
   a. Equipment pads and culverts (Figure 27);
   b. Clean crushed stone and culverts (Figure 28);
   c. Flexi-float or portable bridges (Figure 29); or
   d. Equipment pads or railroad car bridges without culverts

3. Construct crossings as close to perpendicular to the axis of the waterbody channel.

4. Design and maintain each equipment bridge to withstand the highest flows that would occur. Align culverts/flumes to prevent bank erosion or streambed scour. If necessary, install energy dissipating devices downstream of the culverts.

5. Do not use soil to construct or stabilize equipment bridges.

6. Design and maintain equipment bridges to prevent soil from entering the waterbody.

7. Remove equipment bridges as soon as practical after permanent seeding unless agency permits authorized that the bridge remains in place.

8. If there will be more than 1 month between final cleanup and the beginning of permanent seeding and reasonable alternative access to the ROW is available, remove equipment bridges as soon as practical after final cleanup.

### *5.2.3 Clearing and Grading*

1. Confine construction activities and ground disturbance to within the ROW boundaries shown on the construction drawings.

2. Restrict extra work areas (such as staging areas and additional spoil storage areas) to those shown only on the construction drawings. All extra work areas must be located at least 50 feet away from the water's edge, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. If site-specific conditions do not permit a 50-foot setback, the Company can receive written approval from the FERC to locate these extra work areas closer than 50 feet from the water's edge.

3. If the pipeline parallels a waterbody, attempt to maintain at least 15 feet of undisturbed vegetation between the waterbody (and any adjacent wetland) and the ROW except at the crossing location.

4. Clear the ROW adjacent to all waterbodies *up to the high water bank* (where discernible).

5. Immediately remove all cut trees and branches that inadvertently fall into a waterbody and stockpile in an upland area on ROW for disposal.

6. Grade the ROW adjacent to waterbodies *up to within 10 feet of the high water bank*, leaving an ungrubbed vegetative strip intact.

7. Clearing and grading operations may proceed through the 10-foot vegetative strip **only on the working side of the ROW** in order to install the equipment bridge and travel lane. Use temporary sediment barriers to prevent the flow of bank spoil into the waterbody.

8. Maintain adequate flow rates to protect aquatic life and prevent the interruption of existing downstream uses.

### *5.2.4 Installing Temporary Erosion and Sediment Control*

1. Install sediment barriers immediately after initial disturbance of the waterbody or adjacent upland. Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench), until replacement by permanent erosion controls or restoration of adjacent upland areas is complete.

2. Install sediment barriers across the entire construction ROW at all waterbody crossings, where necessary to prevent the flow of sediments into the waterbody. Temporary or removable sediment barriers such as interceptor dikes or drivable berms as described in Section 3.5.4 may be used in lieu of sediment barriers in front of equipment bridges or timber mats across the travel lane. These temporary sediment barriers can be removed during the construction day, but must be reinstalled after construction has stopped for the day and/or when heavy precipitation is imminent.

3. Install sediment barriers as necessary along the edge of the construction ROW to contain spoil and sediment within the ROW where waterbodies are adjacent or parallel to the construction ROW.

4. Use trench plugs at all waterbody crossings to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody. Trench plugs shall be of sufficient size to withstand upslope water pressure.

### *5.2.5 Various Types of Crossings*

Construction at waterbodies will be conducted using two principal crossing methods, a "dry" crossing and a "wet" crossing. The "dry" crossing procedure is further divided into a flumed crossing and a dam and pump crossing. These methods are designed to maintain downstream flow at all times and to isolate the construction zone from the stream flow by channeling the water flow through a flume pipe or by damming the flow and pumping the water around the construction area. The overall objective is to minimize siltation of the waterbody and to facilitate trench excavation of saturated spoil. Unless approved otherwise by the appropriate state agency, pipeline construction and installation must occur using one of the two "dry" crossing methods for waterbodies state-designated as either coldwater or significant coolwater or warmwater fisheries. The flumed and dam and pump crossing methods are applicable to waterbodies up to 30 feet wide at the water's edge at the time of construction. The two "dry" crossings are further described below in Sections 5.2.5.2 and 5.2.5.3.

The "wet" crossing procedure involves open cutting the waterbody without isolating the construction zone from the stream flow. The objective of this method is to complete the waterbody crossing as quickly as practical in order to minimize the duration of impacts to aquatic resources. All streams, their classifications, timing windows, and crossing procedures will be identified in the Clearance Package/Permit Book and on the construction drawings. Table 6-1 outlines the general procedures to be followed at all waterbody crossings.

#### *5.2.5.1 General Crossing Procedures*

1. Dewater trench in accordance with the procedures described in Section 3.5.6.

2. For minor waterbodies:

   a. Place all spoil from the waterbody within the construction ROW at least 10 feet from the water's edge or in the extra work areas shown on the construction drawings. Use sediment barriers to prevent flow of spoil or heavily silt-laden water into the waterbody.

3. For intermediate waterbodies:

   a. Less than 30 feet in width, place all spoil from the waterbody within the construction ROW at least 10 feet from the water's edge or in the extra work areas shown on the construction drawings. Use sediment barriers to prevent flow of spoil or heavily silt-laden water into the waterbody.

   b. Greater than 30 feet in width, spoil may be temporarily sidecast into the waterbody provided that site specific approval is received from the appropriate permitting agency.

4. For major waterbodies:

   a. Place all upland bank spoil from the waterbody within the construction ROW at least 10 feet from the water's edge or in the extra work areas shown on the construction drawings. Use sediment barriers to prevent flow of spoil or heavily silt laden water into the waterbody.

5. Restore and stabilize the banks and channel in accordance with Section 5.2.6.

#### *5.2.5.2 Flumed Crossing*

The flumed crossing method utilizes a flume pipe(s) to transport stream flow across the disturbed area and allows trenching to be done in drier conditions (Figure 30). The flume pipe(s) installed across the trench will be sized to accommodate anticipated stream flows. This method is utilized for perennial waterbodies (minor and intermediate) up to 30 feet wide that are state designated fisheries including coldwater fisheries and warmwater fisheries considered significant by the state. Flumes are generally not recommended for use on a watercourse with a broad unconfined channel, unstable banks, a permeable substrate, excessive stream flow, or where the installation and construction of the flume crossing will adversely affect the bed or banks of the stream.

1. Cross all minor waterbodies that are state-designated fisheries, as identified in the Clearance Package/ Permit Book, using a dry crossing technique (Figures 30, 31).

2. All construction equipment must cross state-designated fisheries on an equipment bridge as specified in Section 5.2.2.

4. The flumed crossing shall be installed as follows:

   a. Install flume pipe(s) after blasting and other rock breaking measures (if required), but before trenching;

   b. Properly align flume pipe(s) to prevent bank erosion and streambed scour;

   c. Use sand bags or equivalent dam diversion structure to provide a seal at either end of the flume to channel water flow (some modifications to the stream bottom may be required to achieve an effective seal);

   d. **Do not remove flume pipe** during trenching, pipe laying (thread pipe underneath the flume pipe(s)). or backfilling activities. or initial streambed restoration efforts unless authorized by agency permits; and

   e. Remove all flume pipes and dams that are not also part of the equipment bridge as soon as final cleanup of the stream bed and bank is complete.

### ***5.2.5.3 Dam and Pump Crossing***

The dam and pump method is presented as an alternative dry crossing procedure to the flumed crossing. The dam and pump crossing is accomplished by utilizing pumps to transport stream flow across the disturbed area (Figure 31). This method involves placing sandbags across the existing stream channel upstream from the proposed crossing to stop water flow and downstream from the crossing to isolate the work area. Pumps are used to pump the water across the disturbed area and back into the stream further downstream. This method is intended for use at perennial waterbodies (minor and intermediate) up to 30 feet wide and state designated fisheries including coldwater fisheries and warmwater fisheries considered significant by the state. The dam and pump procedure allows for more space and flexibility during trenching and pipe installation, which shortens the duration of time spent at the waterbody.

1. The dam and pump method may be used for crossings of waterbodies where pumps can adequately transfer stream flow volumes around the work area, and where there are no concerns about sensitive species passage.

2. Implementation of the dam and pump crossing method will meet the following performance criteria:

    a. Use sufficient pumps, including onsite backup pumps, to maintain downstream flows;

    b. Construct dams with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner);

    c. Screen pump intakes

    d. Prevent streambed scour at pump discharge; and

    e. Monitor the dam and pumps to ensure proper operation throughout the waterbody crossing.

3. The dam and pump crossing shall be installed as follows:

    a. Install and properly seal sandbags at the upstream and downstream location of the crossing;

    b. Create an in-stream sump using sandbags if a natural sump is unavailable for the intake hose;

    c. Initiate pumping of the stream around the work area prior to excavating the trench;

    d. Screen all intake hoses to prevent the entrainment of fish and other aquatic life;

    e. Direct all discharges from the pumps through energy dissipaters to minimize scour and siltation;

    f. Monitor pumps at all times until construction of the crossing is completed; and

    g. Following construction, remove the equipment crossing and sandbag dams.

### *5.2.5.4 Wet Crossing*

This construction technique is typically used to cross waterbodies that are non state-designated as well as intermediate and major waterbodies with substantial flows that cannot be effectively culverted or pumped around the construction zone using the dry crossing techniques (Figure 32). Non-state designated waterbodies include perennial warmwater streams not considered significant by the state, intermittent drainage ditches, and intermittent streams.

The wet-ditch crossing shall be installed as follows:

1. For minor waterbodies:
   a. Equipment bridges are not required at non state-designated fisheries (e.g. agricultural or intermittent drainage ditches). However, if an equipment bridge is used, it must be constructed in accordance with Section 5.2.2;
   b. Limit use of equipment operating in the waterbody to that needed to construct the crossing;
   c. Complete trenching and backfilling in the waterbody (not including blasting and other rock breaking measures) within 24 continuous hours; and
   d. If a flume is installed within the waterbody during mainline activities, it can be removed just prior to lowering in the pipeline. The 24-hour timeframe starts as soon as the flume is removed.
2. For intermediate waterbodies:
   a. Limit use of equipment operating in the waterbody to that needed to construct the crossing. All other construction equipment must cross on an equipment bridge as specified in Section 5.2.2; and
   b. Attempt to complete trenching and backfill work within the waterbody (not including blasting and other rock breaking measures) within 48 continuous hours, unless site-specific conditions make completion within 48 hours infeasible.
3. For major waterbodies:
   a. Company will develop site-specific crossing plans to be submitted for approval by the FERC and the appropriate permitting agency; and
   b. Construct the crossing in accordance with the measures contained in this Plan to the maximum extent practical.

### *5.2.6 Restoration*

1. Return all waterbody banks to preconstruction contours or to stable angle of repose as approved by the EI.

2. Use clean gravel or native cobbles for the upper 12 inches of trench backfill in all waterbodies identified in the Clearance Package/Permit Book as coldwater fisheries.

3. For wet crossings, stabilize waterbody banks and install temporary sediment barriers within 24 hours of completing the crossing. For dry crossings, complete bank stabilization before returning flow to the waterbody channel.

4. Limit the placement of riprap to the slopes along the disturbed waterbody crossing.

5. Install erosion control fabric along waterbodies with low flow conditions (Figure 33).

6. Revegetate disturbed riparian areas with conservation grasses and legumes in accordance with the recommended Upland Seed Mix in Appendix B. In the event that final cleanup is deferred more than 20 days after the trench is backfilled, all slopes within 100 feet of waterbodies shall be mulched with 3 tons/acre of straw.

7. Remove all temporary sediment barriers when replaced by permanent erosion controls or when restoration of adjacent upland areas is successful as specified in Section 8.1.

8. Install a permanent interceptor dike and a trench plug at the base of slopes near each waterbody crossed. Locate the trench plug immediately upslope of the interceptor dike. Permanent interceptor dikes may not be installed in agricultural areas.

## Table 5-1: General Waterbody Crossing Procedures

| | WATERBODY TYPE | | | | | |
|---|---|---|---|---|---|---|
| | MINOR | | INTERMEDIATE | | MAJOR | |
| **WATERBODY CROSSING ACTIVITIES** | Non-State[1] Designated | State[2] Designated | Non-State[3] Designated | State[2] Designated | Non-State[3] Designated | State[2] Designated |
| Flumed Crossing (Dry)<br>*Section 5.2.5.2, Figure 30* | | X | | X | | |
| Dam and Pump Crossing (Dry)<br>*Section 5.2.5.3, Figure 31* | | X | | X | | |
| Wet Crossing<br>*Section 5.2.5.4, Figure 32* | X | | X | X | X | X |
| Construction timing window during the year<br>*Section 5.2.1* | | X | | X | | X |
| Time to complete construction of crossing (not including blasting)[4] | 24 Hours | | 48 Hours | | | |
| Equipment bridge required[5] | | X | X | X | X | X |

[1] Includes agricultural intermittent drainage ditches, intermittent streams, and perennial warmwater streams not considered significant by the state.

[2] Includes all perennial waterbodies that support coldwater fisheries and warmwater fisheries considered significant by the state.

[3] Includes perennial warmwater streams not considered significant by the state.

[4] If a flume is installed within the waterbody during mainline activities, it can be removed just prior to lowering in the pipeline. The 24-hour timeframe starts as soon as the flume is removed.

[5] An equipment bridge may not be required for a waterbody being crossed by a horizontal directional drill.

# 6. WETLAND CROSSINGS

## 6.1 Definition

The term "**Wetland**" as used in this Plan includes any area that satisfies the requirements of the current Federal methodology for identifying and delineating wetlands. Wetland areas have been delineated prior to construction and are identified on the construction drawings.

The wetland crossing procedures described in this Plan comply with the Section 404 Nationwide permit program terms and conditions (33 CFR Part 330). The requirements outlined below do not apply to wetlands in actively cultivated or rotated cropland. Standard upland protective measures including workspace and topsoiling requirements, will apply to these agricultural wetlands.

## 6.2 General Procedures

### *6.2.1 Clearing and Grading*

1. Limit construction activity and ground disturbance in wetland areas to a construction ROW width of 75 feet or as shown on the construction drawings. With written approval from the FERC for site-specific conditions, construction ROW width within the boundaries of federally delineated wetlands may be expanded beyond 75 feet.

2. Wetland boundaries and buffers must be clearly marked in the field with signs and /or highly visible flagging until construction-related ground disturbing activities are complete.

3. Restrict extra work areas (such as staging areas and additional spoil storage areas) to those shown only on the construction drawings. All extra work areas must be located at least 50 feet away from wetland boundaries, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. If site-specific conditions do not permit a 50-foot setback, the Company can receive written approval from the FERC to locate these extra work areas closer than 50 feet from the wetland.

4. Aboveground facilities shall not be located in any wetland, except as permitted or where the location of such facilities outside of wetlands would prohibit compliance with DOT regulations.

5. If standing water or saturated soils are present, or if construction equipment causes ruts or mixing of the topsoil and subsoil in wetlands, use low-ground-weight construction equipment or operate normal equipment on timber riprap, prefabricated equipment mats or terra mats on the working side of the ROW during clearing operations. Do not use more than two layers of timber riprap to stabilize the ROW.

6. Cut vegetation just above ground level and grind stumps to ground level, leaving existing root systems in place. Immediately remove all cut trees and branches from the wetland and stockpile in an upland area on ROW for disposal.

7. Limit pulling of tree stumps and grading activities to directly over the trenchline. Do not grade or remove stumps or root systems from the rest of the ROW in wetlands unless the Chief Inspector and EI determine that safety-related construction constraints require removal of tree stumps from under the working side of the ROW.

8. Do not cut trees outside of the construction ROW to obtain timber for riprap or equipment mats.

9. Cleared materials (slash, logs, brush, wood chips) shall not be permanently placed within wetland areas.

### *6.2.2 Temporary Erosion and Sediment Control*

1. Install sediment barriers immediately after initial ground disturbance at the following locations:
   a. Within the ROW at the edge of the boundary between wetland and upland;
   b. Across the entire ROW immediately upslope of the wetland boundary to prevent sediment flow into the wetland;
   c. Along the edge of the ROW, where the ROW slopes toward the wetland, to protect adjacent, off ROW wetland; and
   d. Along the edge of the ROW as necessary to contain spoil and sediment within the ROW through wetlands.

2. Maintain all sediment barriers throughout construction and reinstall as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete in accordance with Section 8.1.

### *6.2.3 Crossing Procedure*

1. Minimize the length of time that topsoil is segregated and the trench is open.

2. Do not use rock, soil imported from outside the wetland, tree stumps, or brush riprap to stabilize the ROW.

3. Perform topsoil segregation in accordance with Section 3.5.3.1 and trench dewatering in accordance with Section 3.5.6.

4. Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe.

5. Use "push pull" or "float" techniques to place the pipe in the trench where water and other site conditions allow.

6. Install trench plugs and/or seal the trench bottom as necessary to maintain the original wetland hydrology at locations where the pipeline trench may drain a wetland.

7. Install a permanent interceptor dike and a trench plug at the base of slopes near the boundary between the wetland and adjacent upland areas. In addition, install sediment barriers as outlined in Section 3.5.2. Permanent interceptor dikes shall not be installed in agricultural areas.

8. Restore segregated topsoil to its original position after backfilling is complete. When required, additional fill material imported from off the ROW must be approved by the EI. The original wetland contours and flow regimes will be restored to the extent practical.

### *6.2.4 Cleanup and Restoration*

1. Revegetate the ROW with annual ryegrass at 40 lbs/acre PLS or with the recommended Wetland Seed Mix in Appendix B, unless standing water is present.

2. **Do not use lime or fertilizer in wetland areas.**

3. Mulch the disturbed ROW only when required by the appropriate land management or state agency, as identified in the Clearance Package/Permit Book.

4. In the event that final cleanup is deferred more than 20 days after the trench is backfilled, all slopes adjacent to wetlands shall be mulched with 3 tons/acre of straw for a minimum of 100 feet on each side of the crossing.

5. Remove all timber riprap and prefabricated equipment mats upon completion of construction.

6. Develop specific procedures in coordination with the appropriate land management or state agency, where necessary, to prevent the invasion or spread of undesirable exotic vegetation (such as purple loose strife and phragmites).

7. Ensure that all disturbed areas permanently revegetate in accordance with Section 8.1.

8. Remove temporary sediment barriers located at the boundary between wetland and adjacent upland areas after upland revegetation and stabilization of adjacent upland areas are successful as specified in Section 8.1.

# 7. SPILL PREVENTION CONTROL

**7.1** The Contractor shall adhere to the Company's SPCC Plan at all times.

1. Do not store hazardous materials, chemicals, fuels, or lubricating oils within 100 feet of any wetland, waterbody or within any designated municipal watershed area where feasible. If the 100-foot setback cannot be met, this activity can be performed within the 100-foot setback, with EI approval, if done in accordance with the SPCC Plan.
2. Refuel all construction equipment at least 100 feet from any wetland or waterbody, where feasible. If the 100-foot setback cannot be met, this activity can be performed within the 100-foot setback, with EI approval, if done in accordance with the SPCC Plan.
3. Do not perform fondu or concrete coating activities within 100 feet of any wetland or waterbody. If the 100-foot setback cannot be met, these activities can be performed within the 100-foot setback, with EI approval, if done in accordance with the SPCC Plan.

# 8. POST CONSTRUCTION ACTIVITIES

## 8.1 Post-Construction Monitoring

All projects conducted under this Plan, with the exception of insitu pipe replacements (i.e. DOT-mandated replacements, line lowerings, and anomaly repairs), shall meet the monitoring requirements set forth in this section. Company personnel shall perform the following:

1. Establish and implement a program to monitor the success of restoration upon completion of construction and restoration activities;

2. Conduct follow-up inspections of all disturbed upland areas after the first growing season and if necessary, the second growing season (normally 3 to 9 months and 15 to 21 months after seeding, respectively) to determine the success of revegetation;

3. Revegetation in non agricultural areas shall be considered successful if the vegetative cover is sufficient to prevent the erosion of soils on the disturbed ROW and density and cover are similar to that in adjacent undisturbed area. Sufficient coverage in upland areas is defined when vegetation has a uniform 70 percent vegetative coverage. In agricultural areas, revegetation shall be considered successful if crop yields are similar to adjacent undisturbed portions of the same field. Revegetation efforts (such as fertilizing or reseeding) will continue until revegetation is successful;

4. Restoration shall be considered successful if the ROW surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless requested otherwise by the land owner or land managing agency), revegetation is successful, and proper drainage has been restored;

5. Monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in active agricultural areas until restoration is successful;

6. Make efforts to control unauthorized off-road vehicle use, in cooperation with the landowner, throughout the life of the project. Maintain signs, gates, and vehicle trails as necessary;

7. Monitor and record the success of wetland revegetation annually for the first 3 years (or as required by permit) after construction, or longer, until wetland revegetation is successful. Wetland revegetation will be considered successful when the cover of herbaceous and/or woody species is at least 80 percent of the type, density, and distribution of the vegetation in adjacent wetland areas that were not disturbed by construction. If revegetation is not successful at the end of 3 years, the Company shall develop and implement (in consultation with a professional wetland ecologist) a plan to actively revegetate the wetland with native wetland herbaceous and woody plant species; and

8. Inspect all temporary remaining erosion and sedimentation controls during routine patrols to ensure proper functioning. Any deficiencies found will be reported and corrected as needed. Once the area has revegetated and stabilized, the erosion controls will be removed.

## 8.2 Post-Construction Maintenance

All projects conducted under this Plan, with the exception of insitu pipe replacements (i.e. DOT-mandated replacements, line lowerings, and anomaly repairs), shall meet the maintenance requirements set forth in this section. The following requirements restrict the amount of vegetation maintenance that can occur on new pipeline facilities. Where the newly established pipeline ROW is located on other existing ROWs not affiliated with the Company, the easement holder or owner will continue to maintain their ROWs using procedures specified in their vegetative management programs.

### *8.2.1 Uplands*

Routine maintenance of the ROW is required to allow continued access for routine pipeline patrols, maintaining access in the event of emergency repairs, and visibility during aerial patrols. In upland areas, maintenance of the ROW will involve clearing the entire ROW of woody vegetation.

1. Routine vegetation maintenance clearing shall be conducted no more frequently than once every 3 years. However, to facilitate periodic corrosion and leak surveys, a 10-foot wide corridor centered on the pipeline may be maintained annually in a herbaceous state.

2. In no case shall routine vegetation maintenance clearing occur between April 15 and August 1 of any year.

### *8.2.2 Waterbodies and Wetlands*

1. Vegetation maintenance practices on the construction ROW adjacent to waterbodies will consist of maintaining a riparian strip that measures 25 feet back from the mean high water mark. This riparian area will be allowed to permanently revegetate with native plant species across the entire ROW.

2. Vegetation maintenance practices over the full width of the construction ROW in wetlands is prohibited.

3. To facilitate periodic corrosion and leak surveys at wetlands and waterbodies, a 10-foot wide corridor centered on the pipeline may be maintained in an herbaceous state. Trees and shrubs greater than 15 feet in height that are located within 15 feet of the pipeline may be cut and removed from the ROW.

4. Herbicides or pesticides shall not be used in or within 100 feet of a wetland or waterbody, except as specified by the appropriate land management or state agency.

## 8.3 Reporting

The Company shall maintain records that identify by milepost:

1. Method of application, application rate, and type of fertilizer, pH modifying agent, seed, and mulch used;
2. Acreage treated;
3. Dates of backfilling and seeding; and
4. Names of landowners requesting special seeding treatment and a description of the follow-up actions.

For the FERC-certificated projects, the Company will file quarterly activity reports documenting problems, including those identified by the landowner, and corrective actions taken for at least 2 years following construction.

A wetland revegetation monitoring report identifying the status of the wetland revegetation efforts will be filed at the end of 3 years following construction, and annually thereafter until revegetation is successful.

# APPENDIX A

## FIGURES

| FIGURE NUMBER | STANDARD NUMBER | DRAWING TITLE |
|---|---|---|
| FIGURE #1 | ES-0001 | TYPICAL CONSTRUCTION WIDTHS ACQUIRING NEW PERMANENT RIGHT-OF-WAY |
| FIGURE #2 | ES-0002 | TYPICAL CONSTRUCTION WIDTHS NOT ACQUIRING NEW PERMANENT RIGHT-OF-WAY (MULTIPLE LINE SYSTEM) |
| FIGURE #3 | ES-0003 | TYPICAL CONSTRUCTION WIDTHS NOT ACQUIRING NEW PERMANENT RIGHT-OF-WAY (SINGLE LINE SYSTEM) |
| FIGURE #4 | ES-0004 | ACCESS ROAD CROSS SECTION |
| FIGURE #5 | ES-0005 | ROCK ACCESS PAD INSTALLATION AND MAINTENANCE |
| FIGURE #6 | ES-0006 | TYPICAL TEMPORARY ACCESS ROAD THROUGH WETLANDS |
| FIGURE #7 | ES-0007 | SILT FENCE INSTALLATION AND MAINTENANCE |
| FIGURE #8 | ES-0008 | STRAW BALE INSTALLATION AND MAINTENANCE |
| FIGURE #9 | ES-0009 | STRAW BALE INSTALLATION FOR A CHECK DAM IN A DRAINAGE WAY |
| FIGURE #10 | ES-0010 | STORM DRAIN INLET PROTECTION |
| FIGURE #11 | ES-0011 | R.O.W. TOPSOIL SEGREGATION TECHNIQUES |
| FIGURE #12 | ES-0012 | INTERCEPTOR DIKE INSTALLATION AND MAINTENANCE |
| FIGURE #13 | ES-0013 | TYPICAL TRENCH DETAIL |
| FIGURE #14 | ES-0014 | TEMPORARY TRENCH PLUGS |
| FIGURE #15 | ES-0015 | FILTER BAG |
| FIGURE #16 | ES-0016 | PERMANENT TRENCH PLUGS |
| FIGURE #17 | ES-0017 | TRENCH PLUG DETAIL |
| FIGURE #18 | ES-0018 | DEWATERING STRUCTURE FOR HYDROSTATIC TESTING |
| FIGURE #19 | ES-0019 | ALTERNATE DEWATERING STRUCTURE FOR HYDROSTATIC TESTING |
| FIGURE #20 | ES-0020 | CHEVRON INTERCEPTOR DIKE INSTALLATION AND MAINTENANCE |
| FIGURE #21 | ES-0021 | ROCK LINED DRAINAGE SWALE INSTALLATION AND MAINTENANCE |
| FIGURE #22 | ES-0022 | TYPICAL MATTING ON SLOPES |
| FIGURE #23 | ES-0023 | EROSION CONTROL FABRIC INSTALLATION |
| FIGURE #24 | ES-0024 | DRAIN TILE REPAIR PROCEDURE |
| FIGURE #25 | ES-0025 | TYPICAL PAVED ROAD CROSSING CONTROL MEASURES (OPEN CUT) |
| FIGURE #26 | ES-0026 | TYPICAL PAVED ROAD CROSSING CONTROL MEASURES (BORED) |
| FIGURE #27 | ES-0027 | TEMPORARY EQUIPMENT BRIDGE (EQUIPMENT PADS AND CULVERTS) |
| FIGURE #28 | ES-0028 | TEMPORARY EQUIPMENT BRIDGE (CRUSHED STONE AND CULVERTS) |
| FIGURE #29 | ES-0029 | TEMPORARY EQUIPMENT BRIDGE (FLEX-FLOAT OR PORTABLE) |
| FIGURE #30 | ES-0030 | TYPICAL FLUMED CROSSING |
| FIGURE #31 | ES-0031 | TYPICAL DAM AND PUMP CROSSING |
| FIGURE #32 | ES-0032 | TYPICAL WET CROSSING |
| FIGURE #33 | ES-0033 | TYPICAL MATTING OF STREAMBANKS |
| FIGURE #34 | ES-0034 | RIP-RAP PLACEMENT (TYPICAL) |

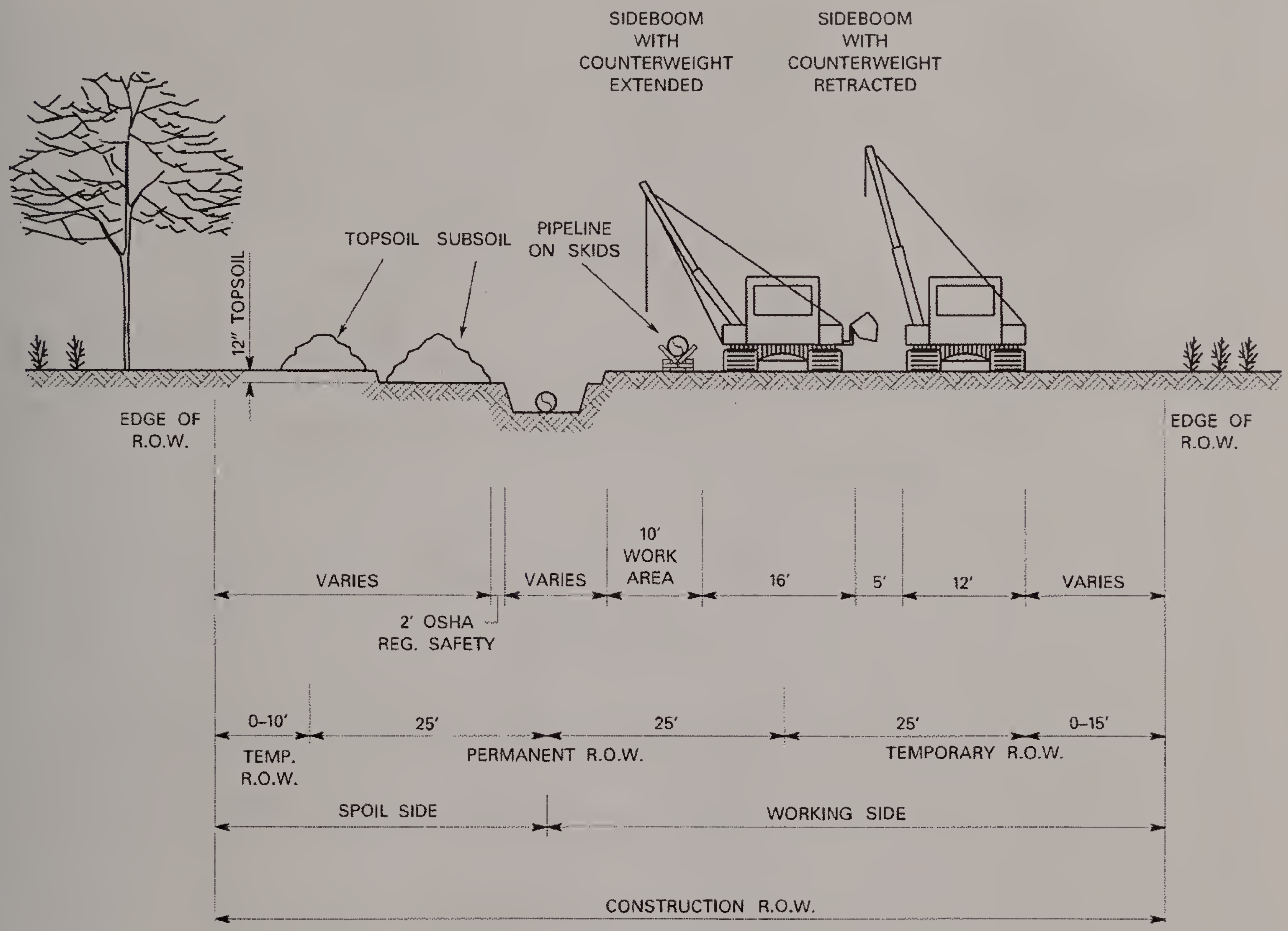
I.G.

ESE0000.DGN

INDEX OF FIGURES

APPENDIX A

DWG. ES-0000 REV.



| PIPE DIAMETER | SPOIL SIDE (FT.) | WORKING SIDE (FT.) | CONSTRUCTION R.O.W. (FT.) |
|---|---|---|---|
| 12" OR LESS | 25 | 50 | 75 |
| 14" – 30" | 35 | 50 | 85 |
| 36" – 42" | 35 | 65 | 100 |
| WETLANDS | 25 | 50 | 75 |

NOTES:

1. ALTHOUGH THE DIMENSIONS SHOWN ARE TYPICAL, SOME VARIATIONS MAY EXIST DUE TO SITE SPECIFIC CONDITIONS. UNLESS OTHERWISE INDICATED ON THE ALIGNMENT SHEETS, THE MAXIMUM WIDTH OF THE CONSTRUCTION RIGHT-OF-WAY SHALL BE AS SHOWN IN THE TABLE FOR THE APPROPRIATE PIPE DIAMETER.

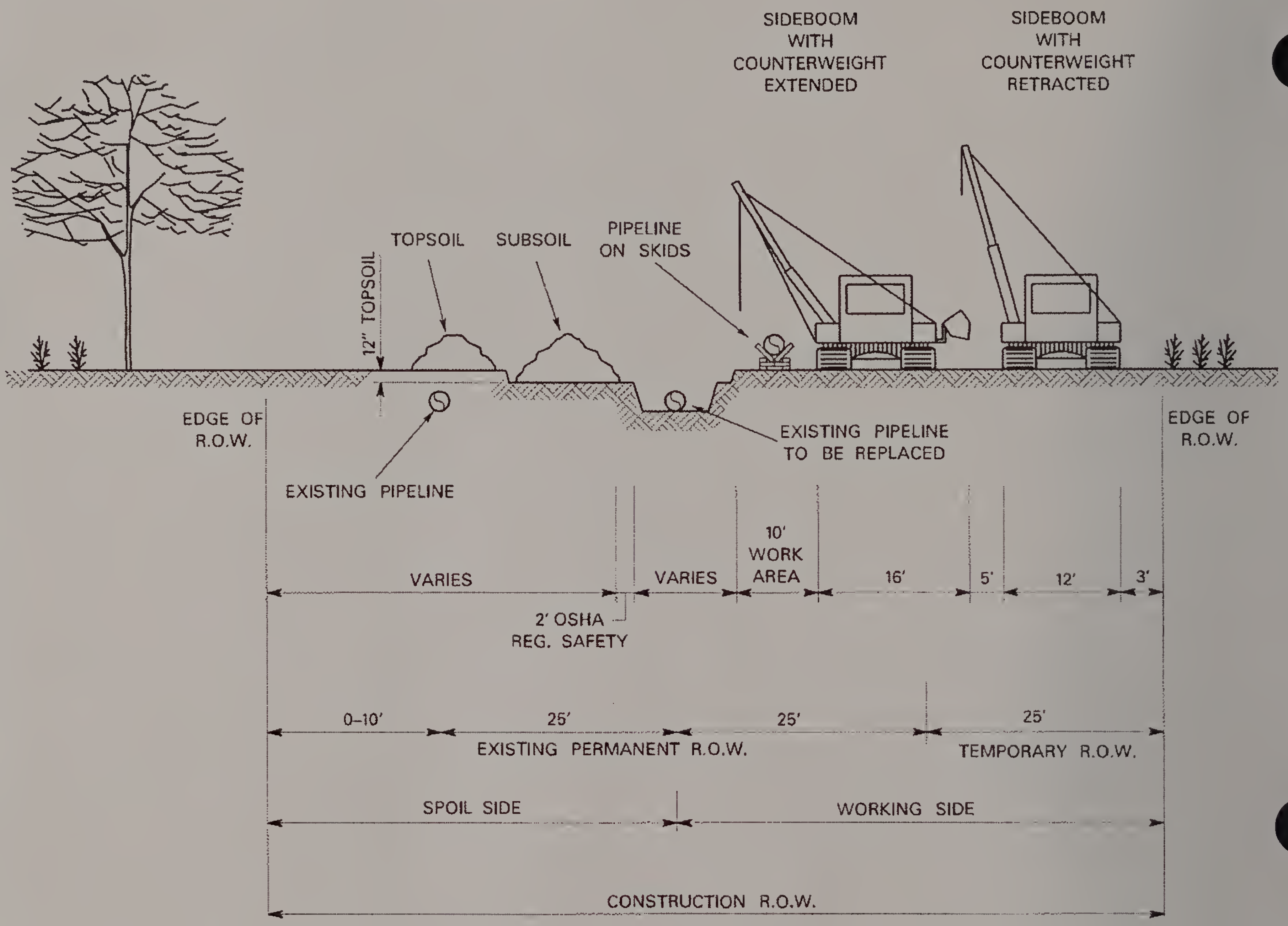
2. TOPSOIL AND SUBSOIL SHALL BE SEGREGATED WITHIN WETLAND, RESIDENTIAL, AGRICULTURAL, PASTURES, HAYFIELDS, AND OTHER AREAS AT LANDOWNER'S OR LAND MANAGING AGENCY'S REQUEST.

I.G.
ESE0001.DGN

TYPICAL CONSTRUCTION WIDTHS ACQUIRING
NEW PERMANENT RIGHT-OF-WAY

FIGURE #1

DWG. ES–0001
REV.



| PIPE DIAMETER | SPOIL SIDE (FT.) | WORKING SIDE (FT.) | CONSTRUCTION R.O.W. (FT.) |
|---|---|---|---|
| 12" OR LESS | 25 | 50 | 75 |
| 14" – 30" | 35 | 50 | 85 |
| 36" – 42" | 35 | 50 | 85 |
| WETLANDS | 25 | 50 | 75 |

NOTES:

1. ALTHOUGH THE DIMENSIONS SHOWN ARE TYPICAL, SOME VARIATIONS MAY EXIST DUE TO SITE SPECIFIC CONDITIONS. UNLESS OTHERWISE INDICATED ON THE ALIGNMENT SHEETS, THE MAXIMUM WIDTH OF THE CONSTRUCTION RIGHT-OF-WAY SHALL BE AS SHOWN IN THE TABLE FOR THE APPROPRIATE PIPE DIAMETER.

2. TOPSOIL AND SUBSOIL SHALL BE SEGREGATED WITHIN WETLAND, RESIDENTIAL, AGRICULTURAL, PASTURES, HAYFIELDS, AND OTHER AREAS AT LANDOWNER'S OR LAND MANAGING AGENCY'S REQUEST.

3. IF THE WORKING SIDE MUST BE GREATER THAN 50 FEET (i.e. TEMPORARY WORKSPACE IS GREATER THAN 25 FEET), COMPANY MUST REQUEST APPROVAL FROM THE F.E.R.C.

jwagner.lev
01/22/2003

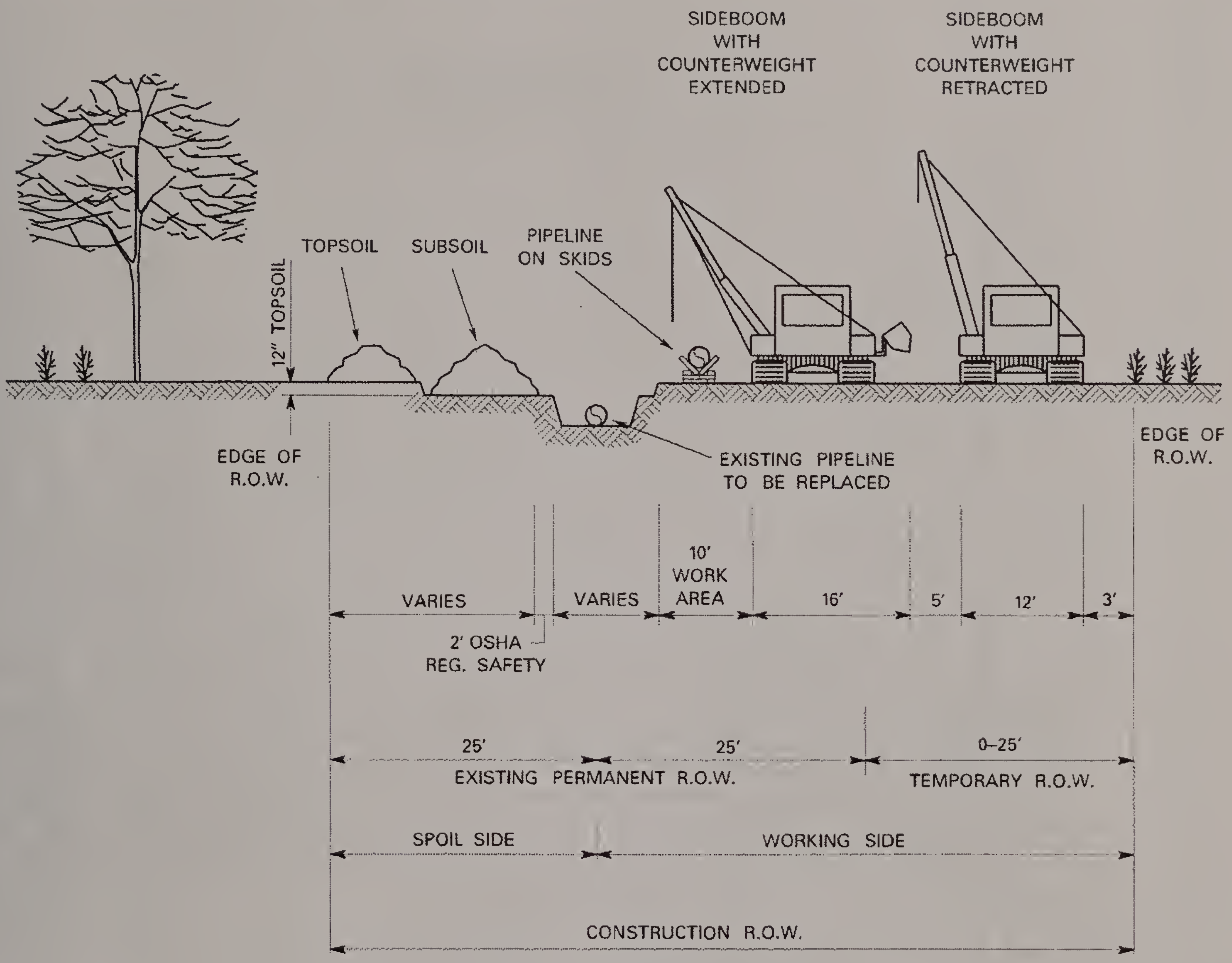
I.G. ESE0002.DGN

TYPICAL CONSTRUCTION WIDTHS NOT ACQUIRING
NEW PERMANENT RIGHT-OF-WAY
(MULTIPLE LINE SYSTEM)

FIGURE #2

DWG. ES–0002

REV.



| PIPE DIAMETER | SPOIL SIDE (FT.) | WORKING SIDE (FT.) | CONSTRUCTION R.O.W. (FT.) |
|---|---|---|---|
| 12" OR LESS | 25 | 25 | 50 |
| 14" – 30" | 25 | 50 | 75 |
| 36" – 42" | 25 | 50 | 75 |
| WETLANDS | 25 | 50 | 75 |

NOTES:

1. ALTHOUGH THE DIMENSIONS SHOWN ARE TYPICAL, SOME VARIATIONS MAY EXIST DUE TO SITE SPECIFIC CONDITIONS. UNLESS OTHERWISE INDICATED ON THE ALIGNMENT SHEETS, THE MAXIMUM WIDTH OF THE CONSTRUCTION RIGHT-OF-WAY SHALL BE AS SHOWN IN THE TABLE FOR THE APPROPRIATE PIPE DIAMETER.

2. TOPSOIL AND SUBSOIL SHALL BE SEGREGATED WITHIN WETLAND, RESIDENTIAL, AGRICULTURAL, PASTURES, HAYFIELDS, AND OTHER AREAS AT LANDOWNER'S OR LAND MANAGING AGENCY'S REQUEST.

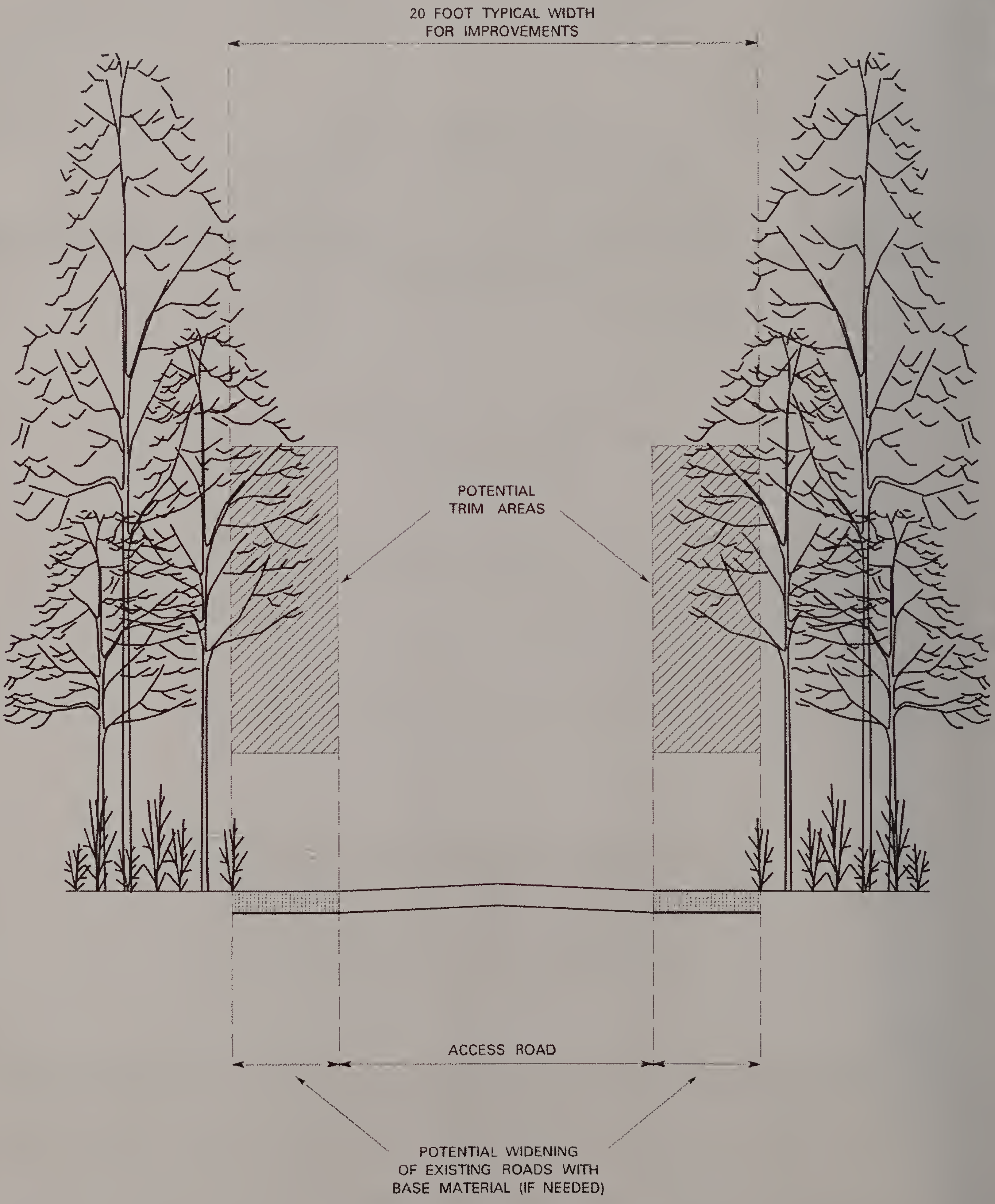
3. IF THE WORKING SIDE MUST BE GREATER THAN THE VALUES SHOWN IN THE TABLE, COMPANY MUST REQUEST APPROVAL FROM THE F.E.R.C.

I.G. ESE0003.DGN

TYPICAL CONSTRUCTION WIDTHS NOT ACQUIRING
NEW PERMANENT RIGHT-OF-WAY
(SINGLE LINE SYSTEM)

FIGURE #3

DWG. ES–0003 REV.



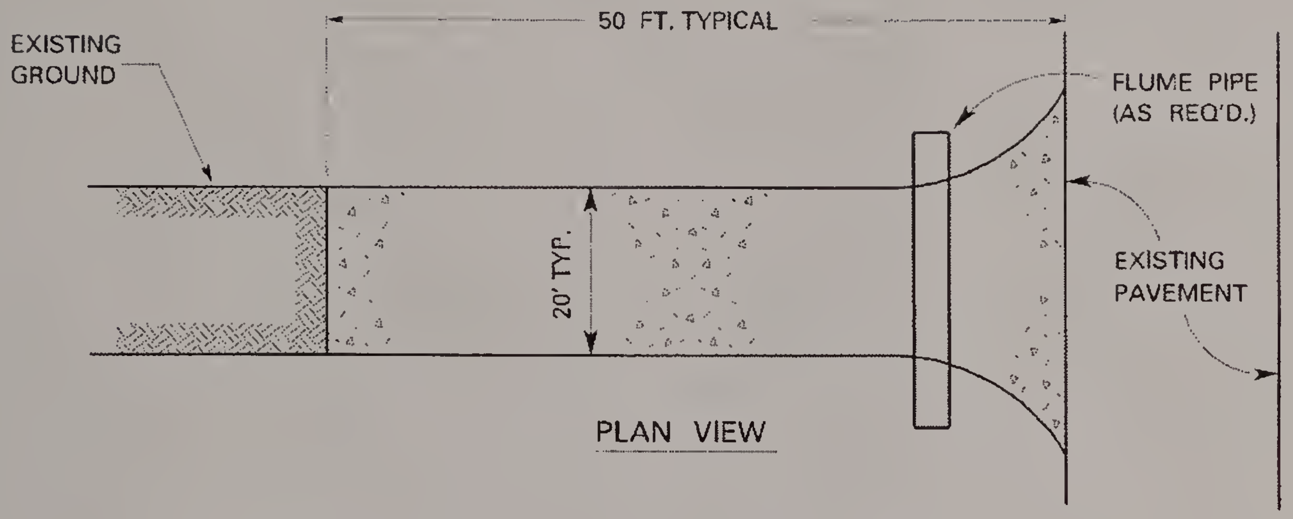
ACCESS ROAD CROSS SECTION

FIGURE #4

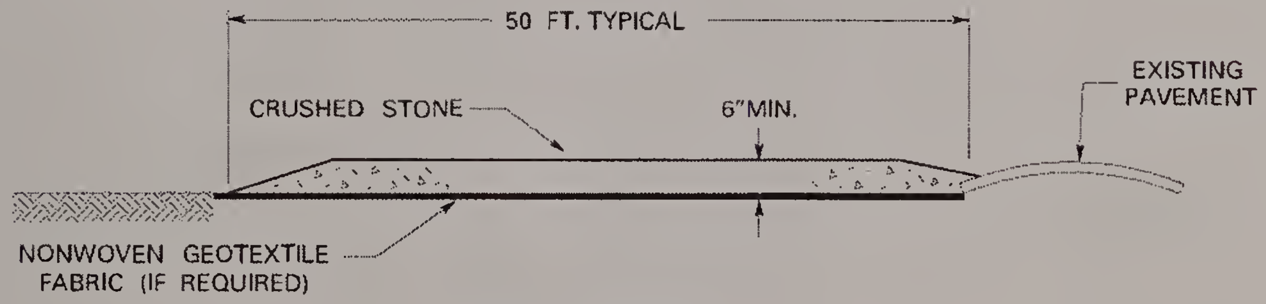
DWG. ES–0004 REV.

I.G. ESE0004.DGN

$$$$$USERNAME$$$$
$$$$$SYTIME$$$$$$



PLAN VIEW



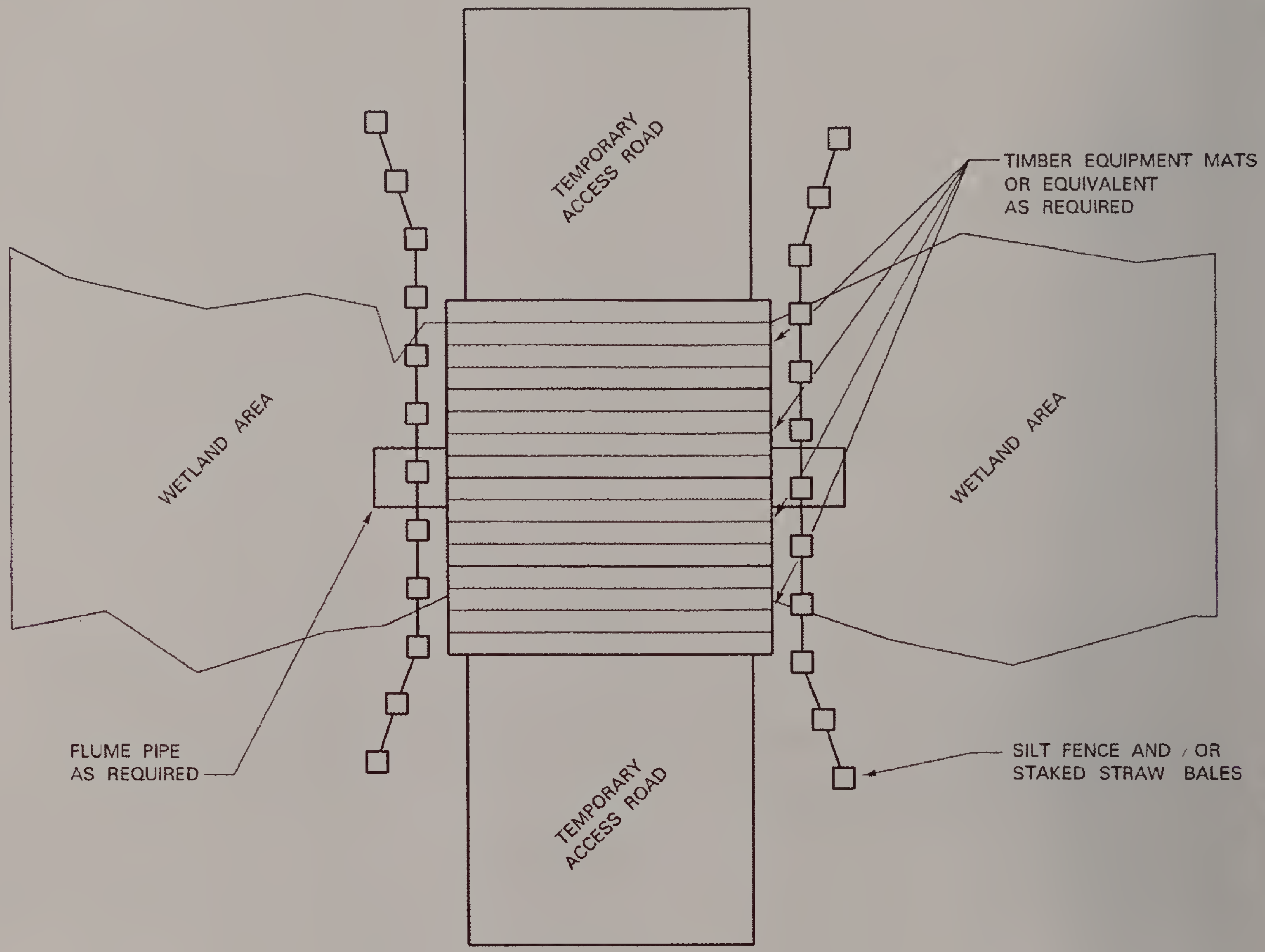
CROSS-SECTION

CONSTRUCTION SPECIFICATIONS:

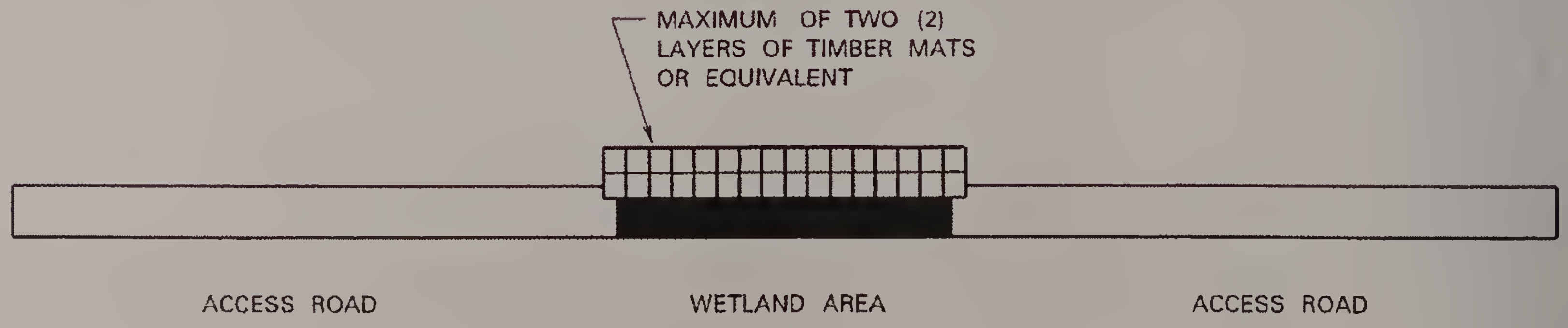
1. STONE SIZE = 4" - 6" (AVG.) CRUSHED STONE
2. ALL STONE MUST BE PLACED ON NON-WOVEN GEOTEXILE FABRIC IF USED IN RESIDENTIAL OR ACTIVE AGRICULTURAL AREAS.
3. LENGTH = FIFTY (50) FOOT TYPICAL (IF SITE CONDITIONS ALLOW)
4. WIDTH = TWENTY (20) FOOT TYPICAL.
5. THICKNESS = SIX (6) INCHES MINIMUM.
6. ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A DRIVEABLE BERM OR OTHER TEMPORARY EROSION CONTROL DEVICE CAN BE USED.
7. THE ENTRANCE SHALL BE PERIODICALLY INSPECTED AND MAINTAINED IN A CONDITION THAT MINIMIZES TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. MAINTENANCE MAY INCLUDE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR THE REPAIR /CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ANY SEDIMENT THAT IS SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED AS SOON AS PRACTICAL.

| | | |
|---|---|---|
| | ROCK ACCESS PAD INSTALLATION AND MAINTENANCE | FIGURE #5 |
| | | DWG. ES-0005 REV. |

I.G.ESE0005.DGN
$$$$USERNAME$$$$
$$$$SYSTIME$$$$



PLAN VIEW
N.T.S.



CROSS SECTION
N.T.S.

$$$$$USERNAME$$$$
$$$$$SYTIME$$$$$

ESE0006.DGN

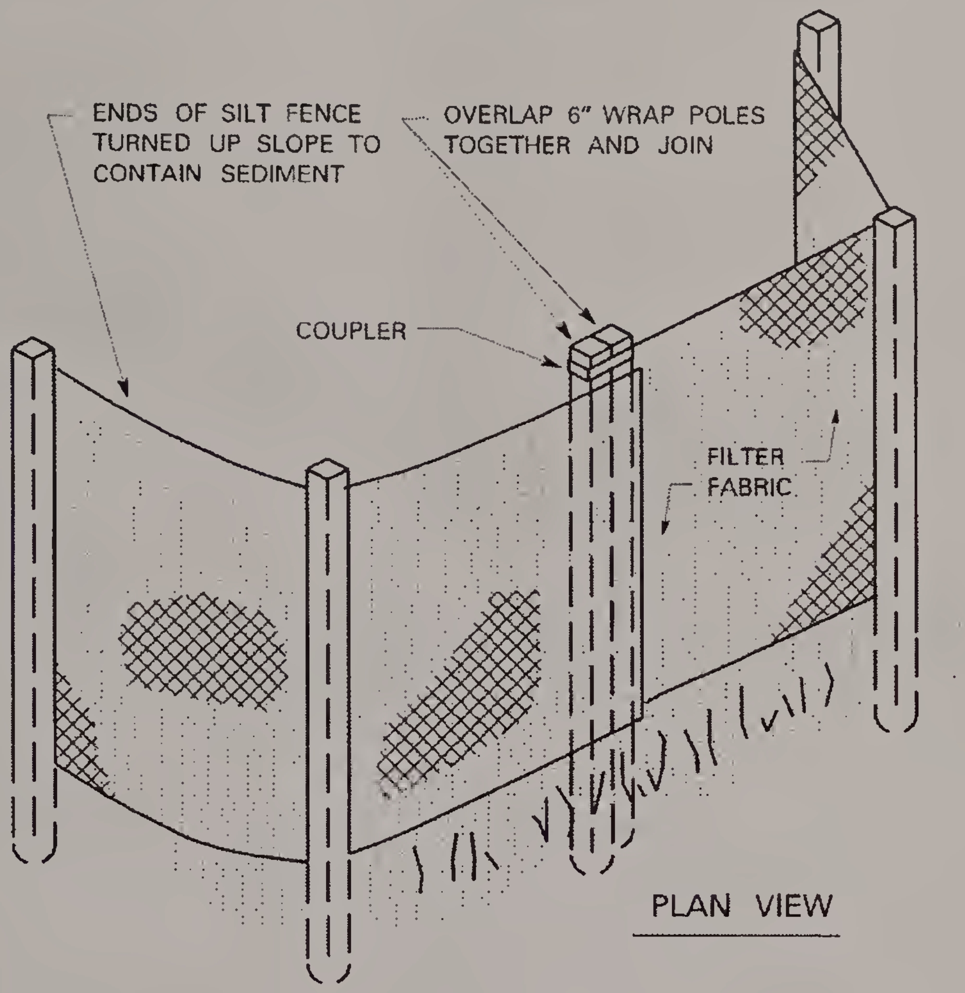
I.C.

TYPICAL TEMPORARY ACCESS ROAD
THROUGH WETLANDS

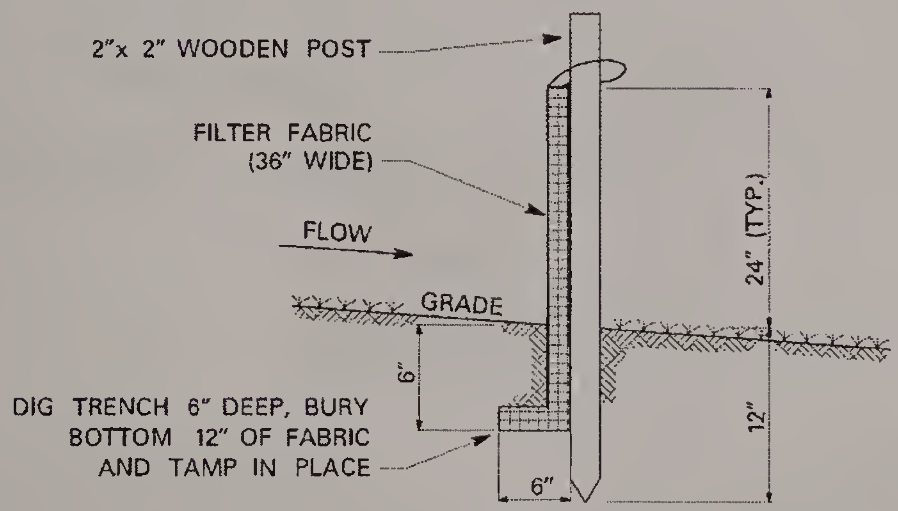
FIGURE #6

DWG. ES–0006

REV.


ENDS OF SILT FENCE TURNED UP SLOPE TO CONTAIN SEDIMENT
OVERLAP 6" WRAP POLES TOGETHER AND JOIN
COUPLER
FILTER FABRIC

PLAN VIEW



CROSS SECTION

## INSTALLATION REQUIREMENTS:

- WHEN USING SILT FENCE, PLACE IT:
    - BETWEEN DISTURBED AREAS AND DOWN-SLOPE ENVIRONMENTAL RESOURCE AREAS
    - AT THE BASE OF ALL SLOPES NEXT TO WETLANDS, WATERBODIES, AND ROAD CROSSINGS
    - AT THE INLET AND OUTLET OF OPEN DRAINAGE STRUCTURES
    - APPROXIMATELY 6 FEET BEYOND THE TOE OF THE SLOPE TO GIVE THE SEDIMENT ROOM TO COLLECT
- USE SANDBAGS OR BACKFILLING TO KEY IN THE BOTTOM OF THE FABRIC WHERE IT IS NOT FEASIBLE TO TRENCH IT IN (LEDGES, ROCKY SOIL, LARGE ROOTS, ETC.)

## MAINTENANCE REQUIREMENTS:

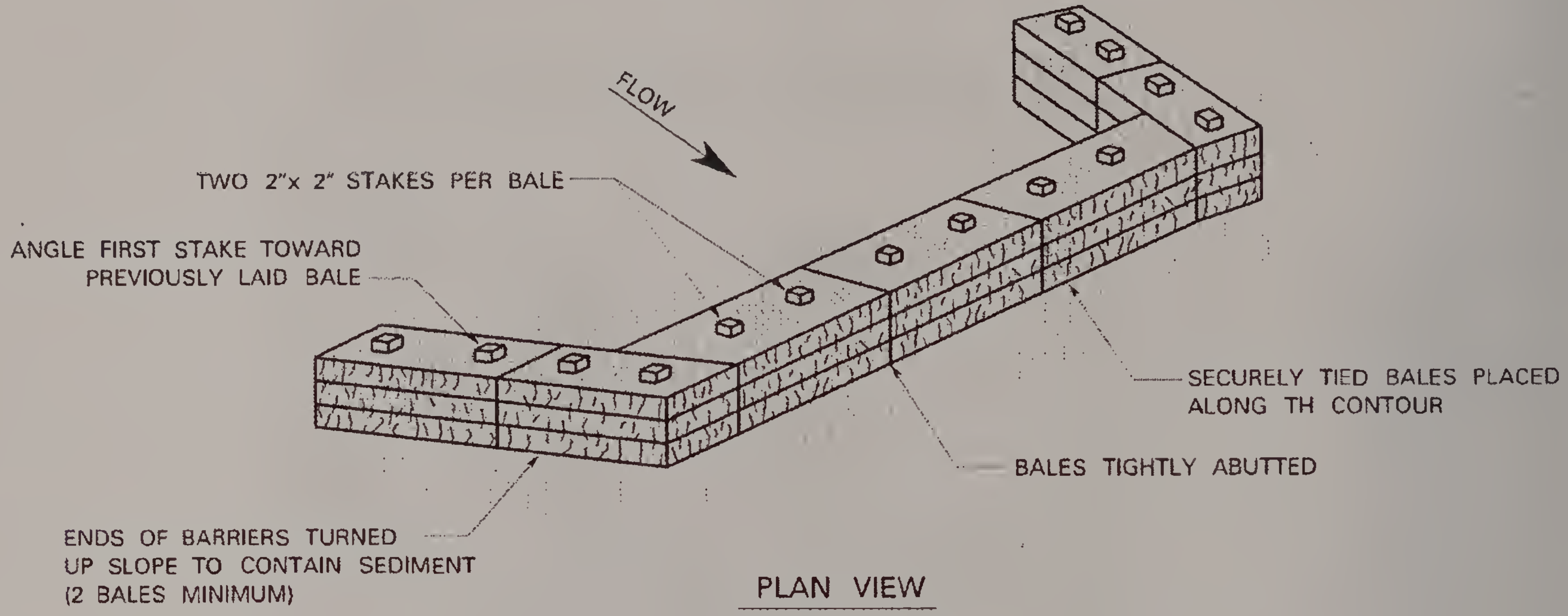
- INSPECT SILT FENCE:
    - DAILY IN AREAS OF ACTIVE CONSTRUCTION
    - WEEKLY IN AREAS WITH NO CONSTRUCTION
    - WITHIN 24 HOURS FOLLOWING EACH MAJOR STORM EVENT
- REPAIR OR REPLACE SILT FENCE AS NEEDED
- REMOVE ACCUMULATED SEDIMENTS TO AN UPLAND AREA AS NEEDED

I.G. ESE0007.DGN

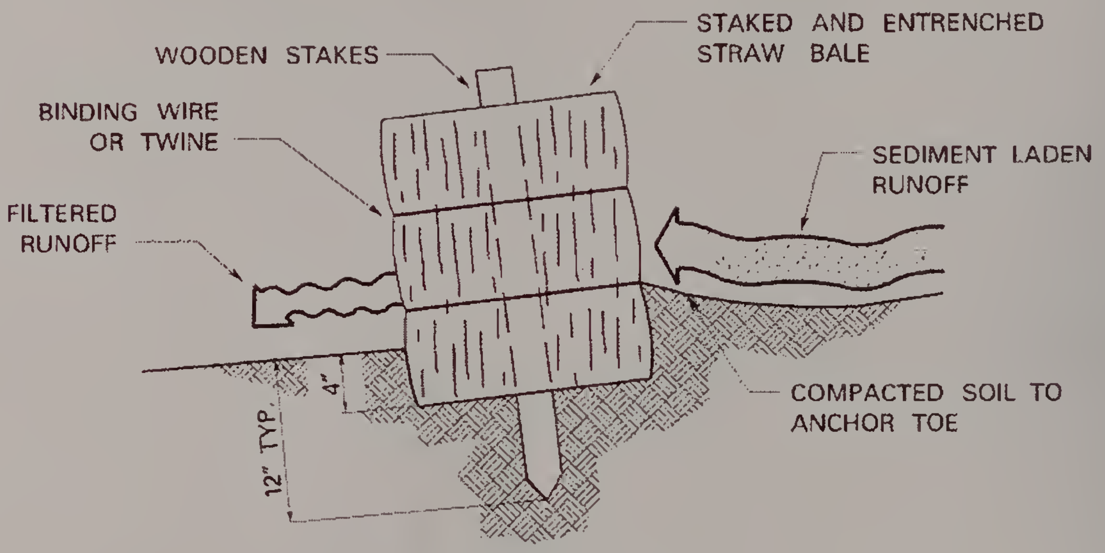
SILT FENCE INSTALLATION
AND MAINTENANCE

FIGURE #7

DWG. ES-0007 REV.


FLOW
TWO 2"x 2" STAKES PER BALE
ANGLE FIRST STAKE TOWARD PREVIOUSLY LAID BALE
SECURELY TIED BALES PLACED ALONG TH CONTOUR
BALES TIGHTLY ABUTTED
ENDS OF BARRIERS TURNED UP SLOPE TO CONTAIN SEDIMENT (2 BALES MINIMUM)

PLAN VIEW



CROSS-SECTION

## INSTALLATION REQUIREMENTS:

- WHEN USING STRAW BALES, PLACE THEM:
  - WITH THEIR ENDS TIGHTLY ABUTTING AND EMBEDDED IN THE SOIL A TYPICAL OF 4".
  - BETWEEN DISTURBED AREAS AND DOWN-SLOPE ENVIRONMENTAL RESOURCE AREAS.
  - AT THE BASE OF ALL SLOPES NEXT TO WETLANDS, WATERBODIES, AND ROAD CROSSINGS
  - AT THE INLET AND OUTLET OF OPEN DRAINAGE STRUCTURES.
  - APPROXIMATELY 6 FEET BEYOND THE TOE OF THE SLOPE TO GIVE THE SEDIMENT ROOM TO COLLECT.
- KEY IN THE BOTTOM OF THE BALE. IN AREAS WHERE IT IS NOT FEASIBLE TO TRENCH IT IN (LEDGES, ROCKY SOIL, LARGE TREE ROOTS, ETC.), USE NATIVE SOIL AS BACKFILL UP-SLOPE OF THE BALE.
- IF USED IN CONJUNCTION WITH SILT FENCE, BALES ARE PLACED UPSLOPE OF THE SILT FENCE AND DO NOT NEED TO BE TRENCHED IN.

## MAINTENANCE REQUIREMENTS:

- INSPECT BALES:
  - DAILY IN AREAS OF ACTIVE CONSTRUCTION.
  - WEEKLY IN AREAS WITH NO CONSTRUCTION.
  - WITHIN 24 HOURS FOLLOWING EACH MAJOR STORM EVENT.
- REPAIR OR REPLACE BALES AS NEEDED.
- REMOVE ACCUMULATED SEDIMENTS TO AN UPLAND AREA AS NEEDED.

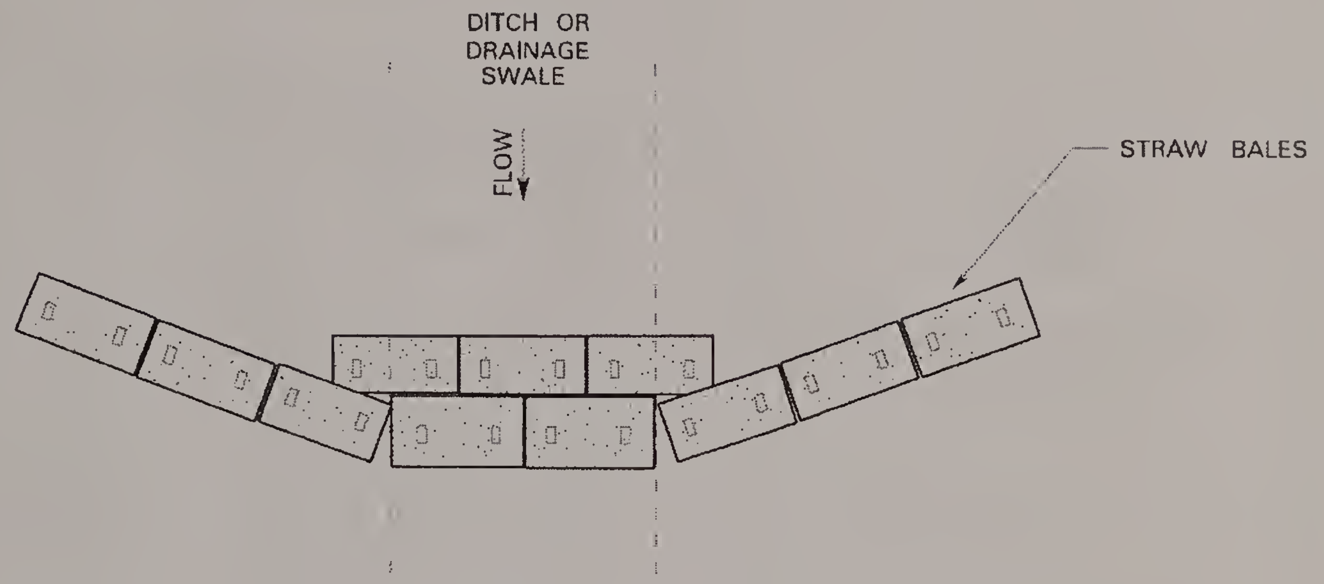
$$$$USERNAME$$$$
$$$$SYSTIME$$$$

I.G. ESE0008.DGN

STRAW BALE INSTALLATION
AND MAINTENANCE

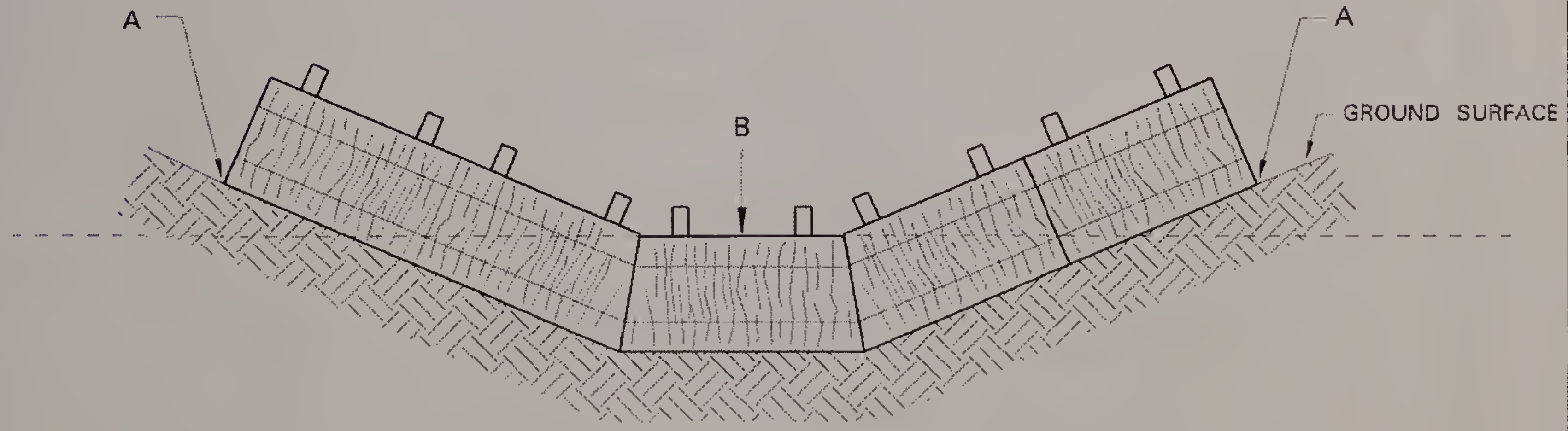
FIGURE #8

DWG. ES-0008 REV.



PLAN VIEW
N.T.S.

POINTS A SHALL BE HIGHER THAN POINT B



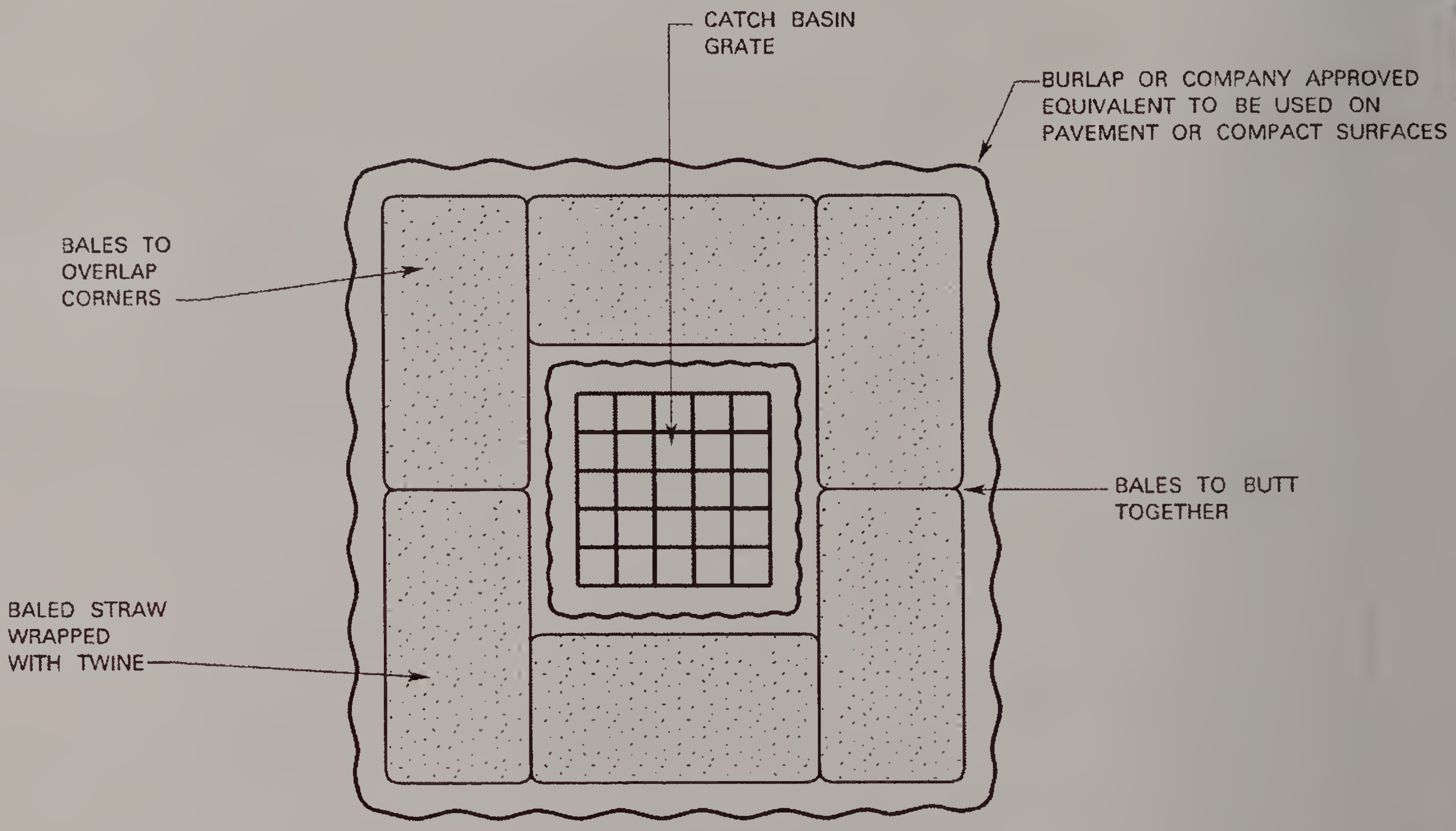
CROSS-SECTION
N.T.S.

$$$$USERNAME$$$$
$$$$SYSTIME$$$$
I.G.ESE0009.DGN

STRAW BALE INSTALLATION
FOR A CHECK DAM IN A
DRAINAGE WAY

FIGURE #9

DWG. ES-0009
REV.


CATCH BASIN GRATE
BURLAP OR COMPANY APPROVED EQUIVALENT TO BE USED ON PAVEMENT OR COMPACT SURFACES
BALES TO OVERLAP CORNERS
BALES TO BUTT TOGETHER
BALED STRAW WRAPPED WITH TWINE

1. SURROUND STREET DRAINAGE STRUCTURE INLET WITH BALES PRIOR TO CONSTRUCTION AND MAINTAIN UNTIL CONSTRUCTION IS COMPLETED.

2. FOR BALES PLACED ON PAVEMENT (OR COMPACT SURFACES), PLACE BURLAP OR COMPANY APPROVED EQUIVALENT BETWEEN PAVEMENT AND BALE.

3. REMOVE ACCUMULATED SEDIMENT.

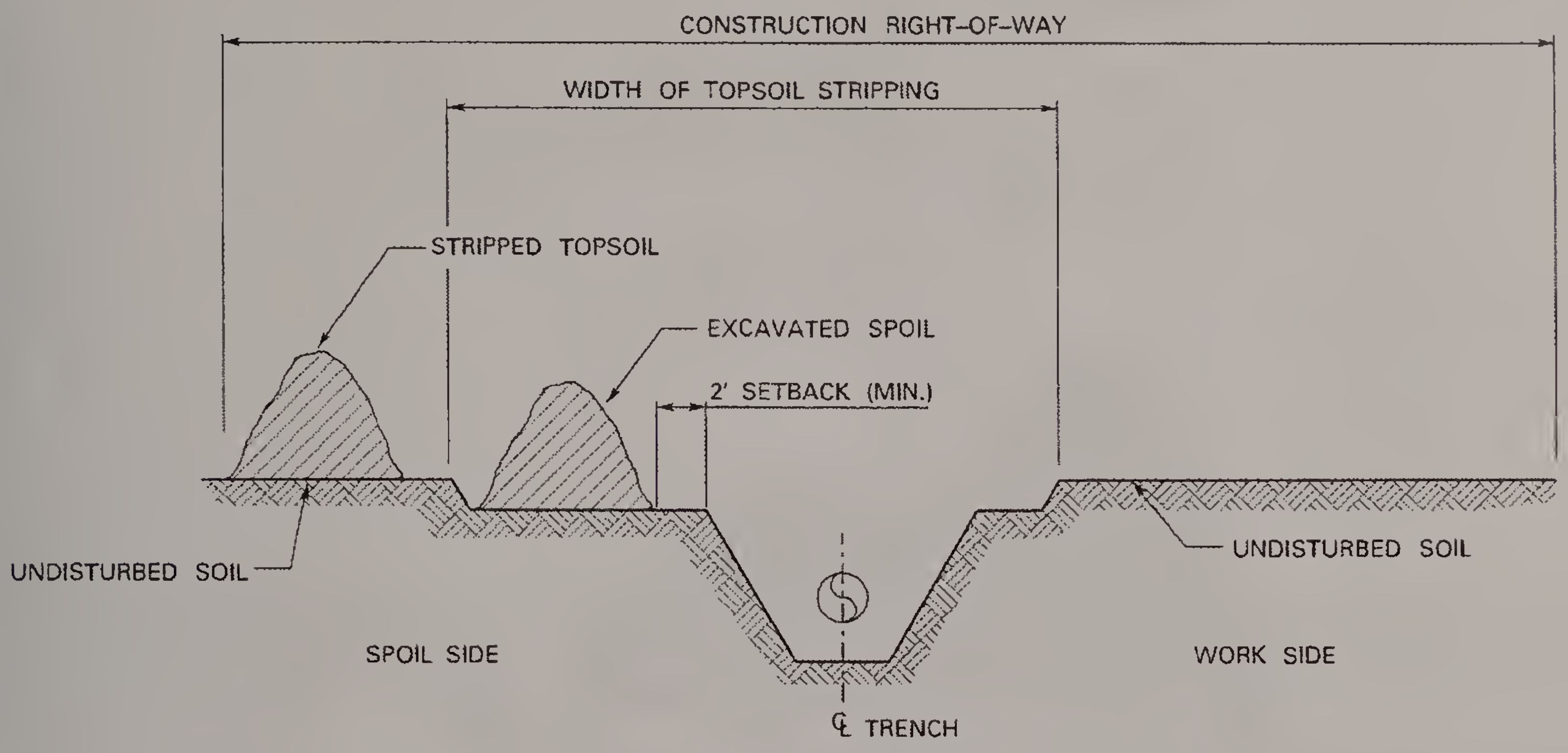
$$$$USERNAME$$$$
$$$$SYTIME$$$$

I.C. ESE0010.DGN

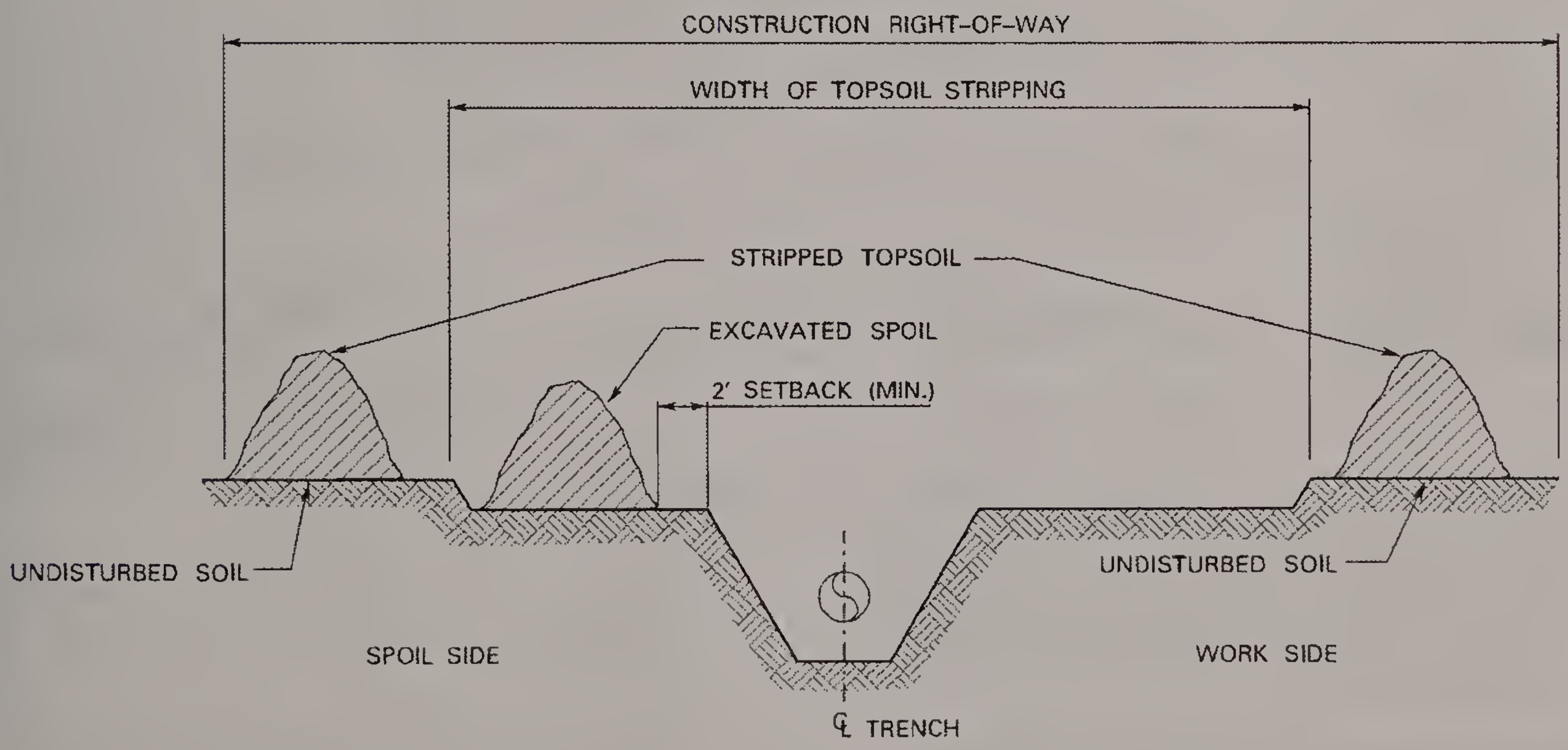
STORM DRAIN INLET PROTECTION

FIGURE #10

DWG. ES–0010 REV.



DITCH PLUS SPOILSIDE TOPSOIL SEGREGATION



FULL RIGHT-OF-WAY TOPSOIL STRIPPING

NOTES:

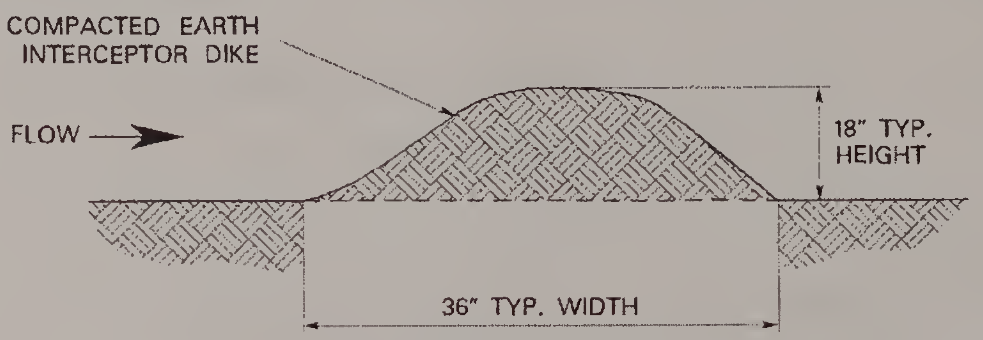
1. TOPSOIL MAY BE STORED IN LOCATIONS AS SHOWN ABOVE, OR AT OTHER COMPANY APPROVED LOCATIONS WITHIN THE CONSTRUCTION R.O.W.
2. LEAVE GAPS IN SPOIL PILES FOR WATER RUN-OFF.
3. R.O.W. MAY BE EXPANDED UP TO 25' IN NON WETLAND AREAS FOR FULL R.O.W. TOPSOIL SALVAGE.

I.G. ESE0011.DGN

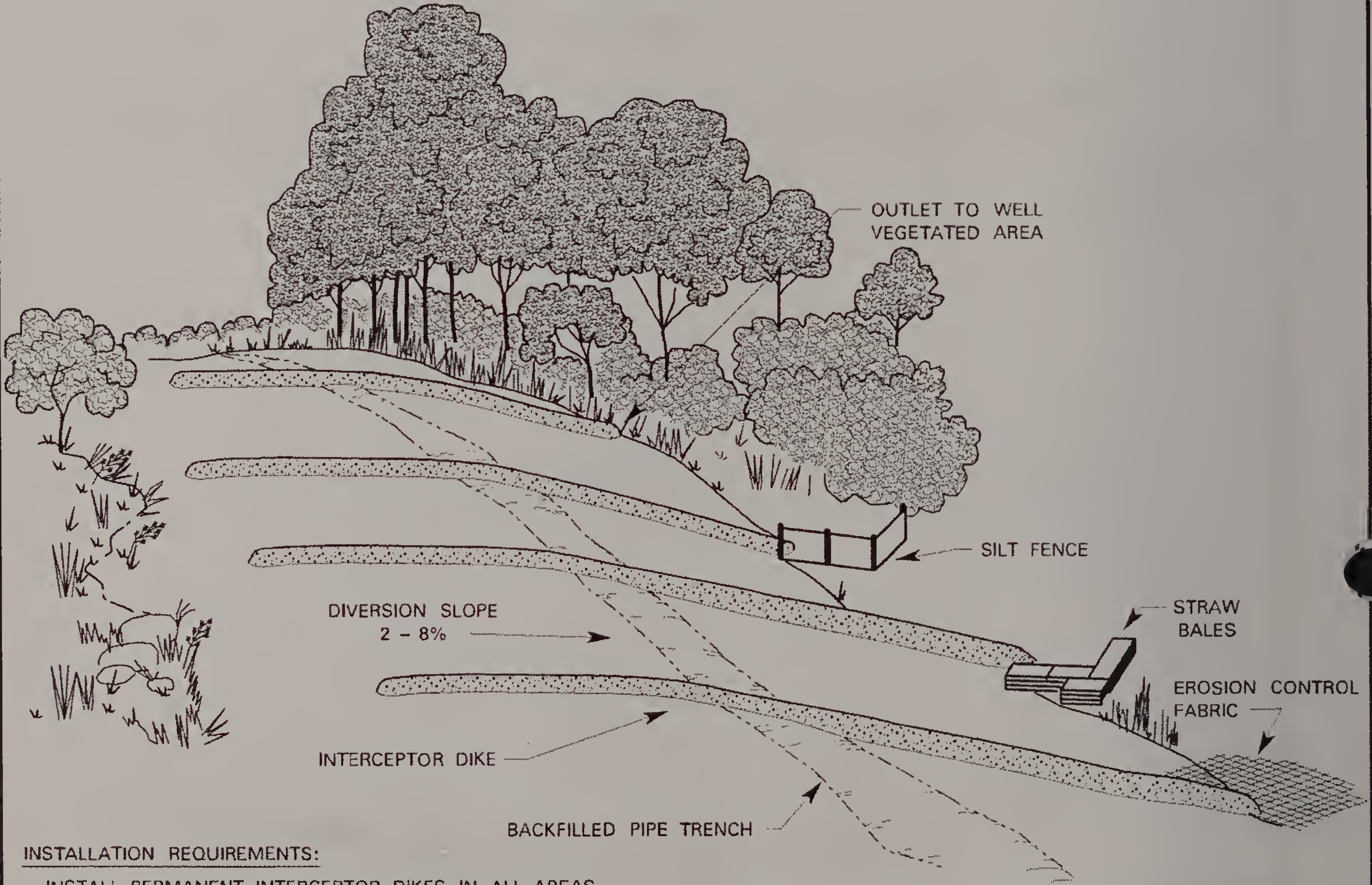
R.O.W. TOPSOIL SEGREGATION TECHNIQUES

FIGURE #11

DWG. ES-0011 REV.



CROSS SECTION



INSTALLATION REQUIREMENTS:

- INSTALL PERMANENT INTERCEPTOR DIKES IN ALL AREAS EXCEPT RESIDENTIAL OR AGRICULTURAL AS NECESSARY TO AVOID EXCESSIVE EROSION (UNLESS AUTHORIZED BY LANDOWNER OR LAND MANAGING AGENCY IN AGRICULTURAL OR RESIDENTIAL AREA).

- MUST BE INSTALLED ON SLOPES GREATER THAN 5% WHERE THE BASE OF THE SLOPE IS LESS THAN 50 FEET FROM A WATERBODY, WETLAND OR ROAD CROSSING AT THE FOLLOWING MINIMUM SPACING:

| SLOPE (%) | SPACING (FT.) |
|---|---|
| 5 – 15 | 300 |
| >15 – 30 | 200 |
| >30 | 100 |

- CONSTRUCT USING EARTH FILLED SACKS, STAKED STRAW BALES, SILT FENCE, OR SOIL FOR TEMPORARY OR COMPACTED EARTH AND ROCK FOR PERMANENT

- INSTALL WITH A 2 – 8% OUTFALL ANGLE.

- POSITION OUTFALL TO PREVENT SEDIMENT DISCHARGE INTO WETLANDS, WATERBODIES, OR OTHER SENSITIVE RESOURCES.

- FILTER RUN–OFF WATER BY CONSTRUCTING THE OUTLET IN A WELL VEGETATED STABLE AREA, OR BY USING AN ENERGY DISSIPATING DEVICE (SILT FENCE, STRAW BALES, EROSION CONTROL FABRIC), AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

MAINTENANCE REQUIREMENTS:

- INSPECT DURING AND FOLLOWING CONSTRUCTION AND MAKE REPAIRS AS NEEDED.

- KEEP THE CHANNEL FREE OF DEBRIS AND OBSTRUCTIONS.

- SEED AND MULCH PERMANENT INTERCEPTOR DIKES FOLLOWING CONSTRUCTION.

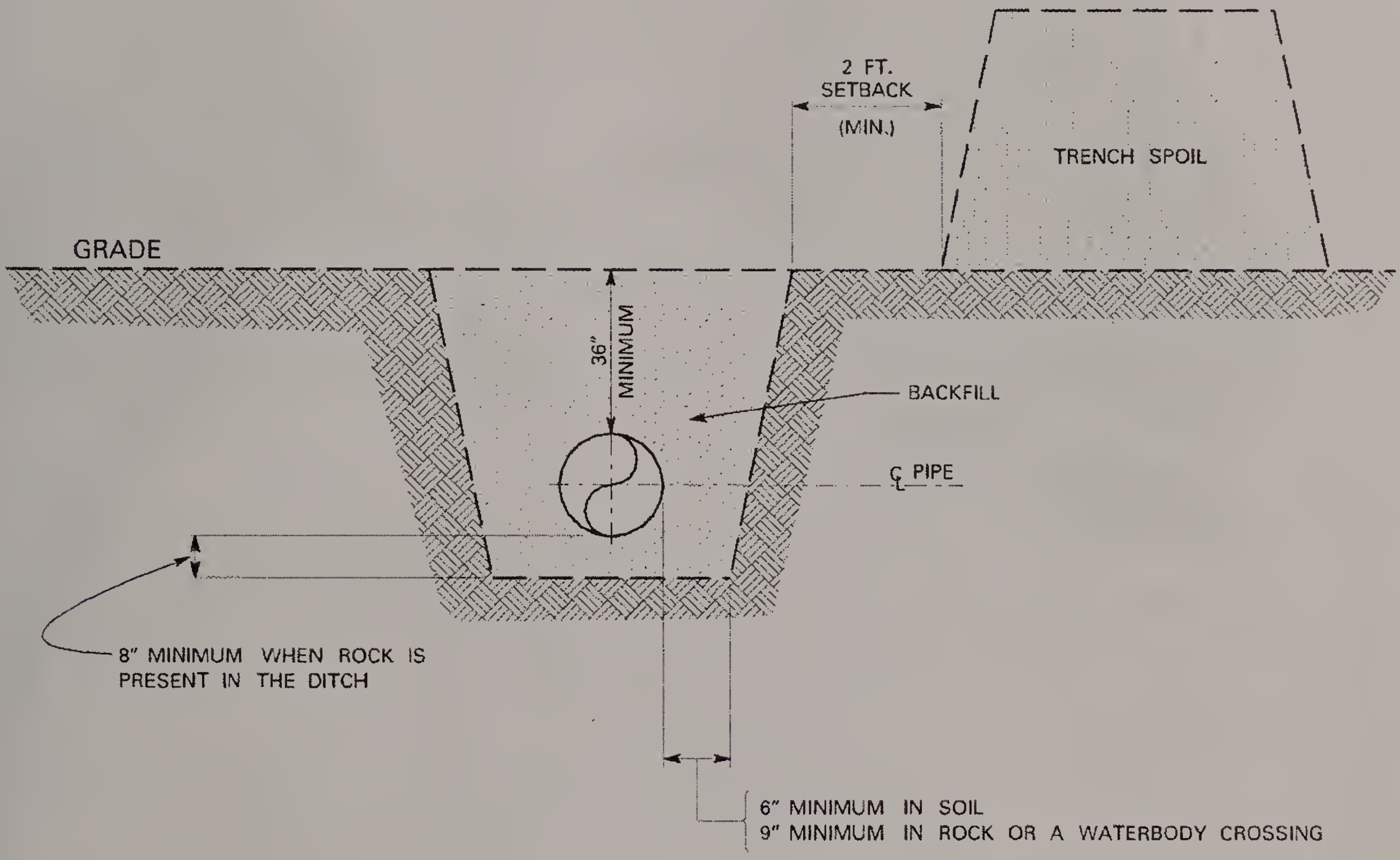
tsmith
02/18/2003

I.G. ESE0012.DGN

INTERCEPTOR DIKE INSTALLATION
AND MAINTENANCE

FIGURE #12

DWG. ES–0012 REV.

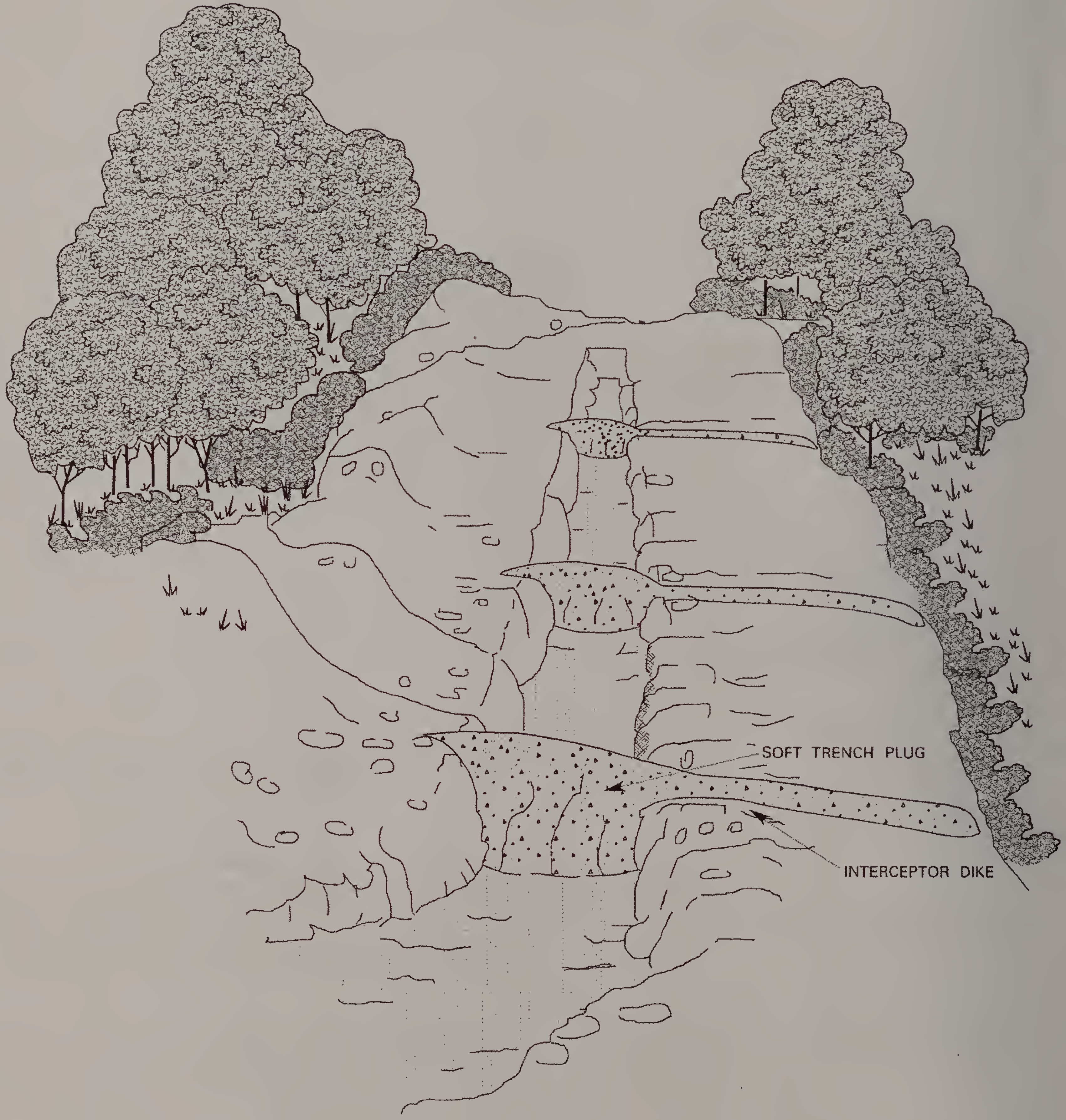


CROSS-SECTION VIEW OF TYPICAL TRENCH

NOTES:

1. ALL ORIGINAL CONTOURS WILL BE RE-ESTABLISHED UPON COMPLETION OF PIPE INSTALLATION. EXCEPT IN WETLANDS, A CROWN MAY BE LEFT TO ACCOUNT FOR DITCH SETTLING, AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.
2. IN COLD WATER FISHERY STREAMS, THE TOP 12" OF THE TRENCH WILL BE BACKFILLED WITH CLEAN GRAVEL OR NATIVE COBBLES.

| | | |
|---|---|---|
| I.C. ESE0013.DGN | TYPICAL TRENCH DETAIL | FIGURE #13 |
| | | DWG. ES–0013 REV. |



NOTES:

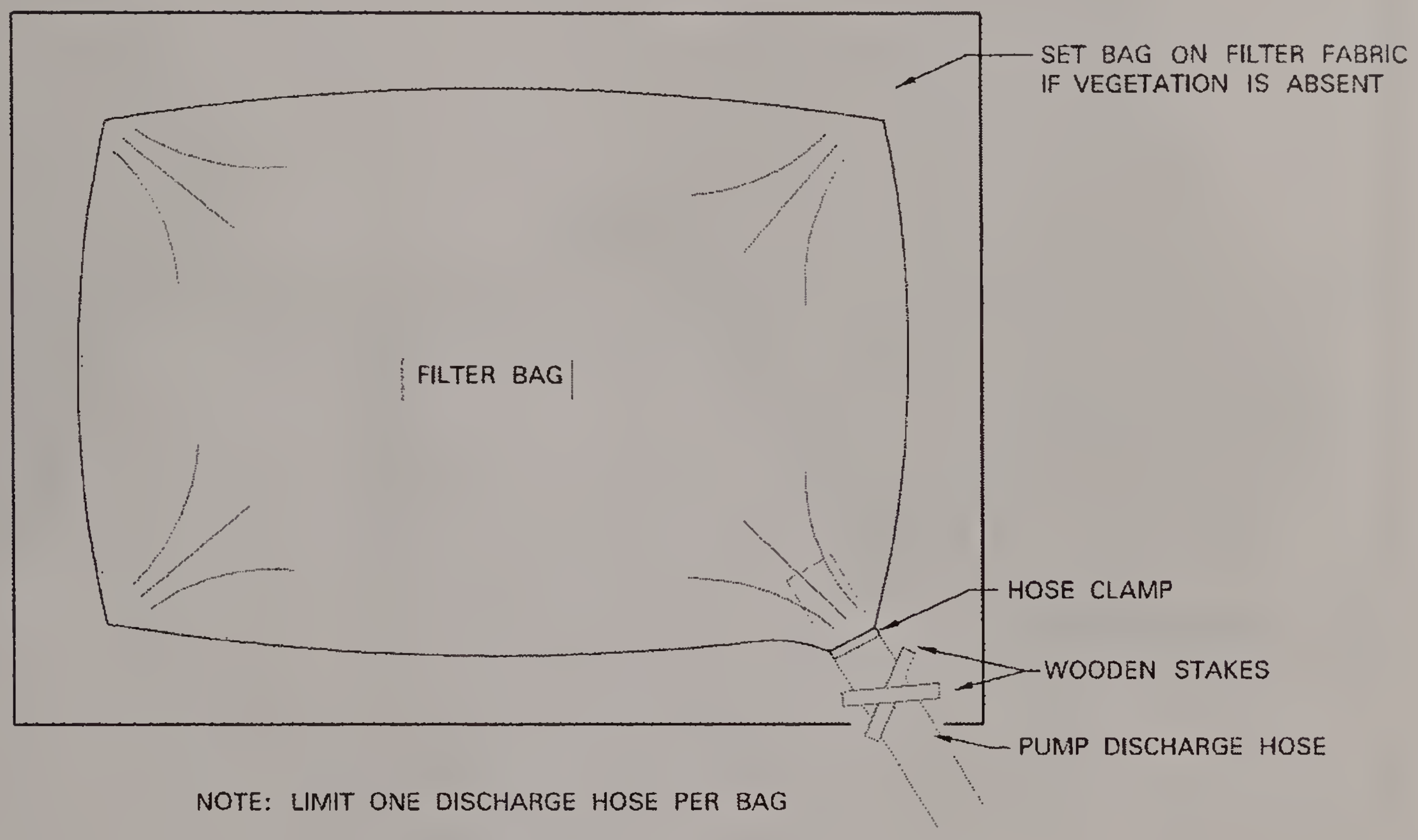
1. TEMPORARY TRENCH PLUGS MAY BE USED IN CONJUNCTION WITH INTERCEPTOR DIKES TO PREVENT WATER FROM OVERFLOWING INTO SENSITIVE RESOURCE AREAS.

2. DIVERT TRENCH OVERFLOW TO A WELL-VEGETATED OFF-R.O.W. LOCATION OR INSTALL APPROPRIATE ENERGY DISSIPATING DEVICE.

jwhberleh
01/22/2003

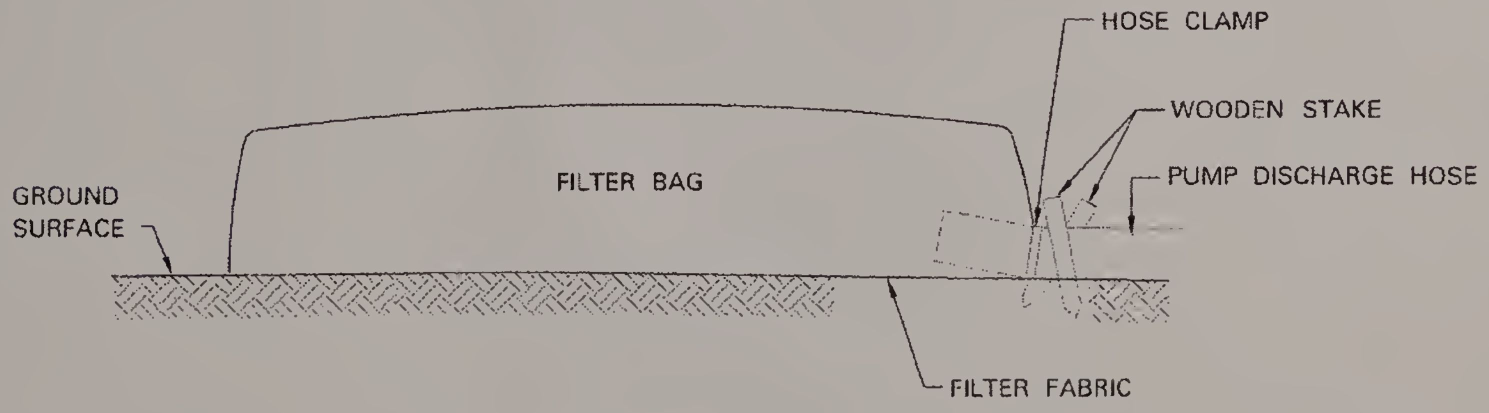
I.G. ESE0014.DGN

| | | |
|---|---|---|
| | TEMPORARY TRENCH PLUGS | FIGURE #14<br>DWG. ES–0014 REV. |



NOTE: LIMIT ONE DISCHARGE HOSE PER BAG

PLAN VIEW



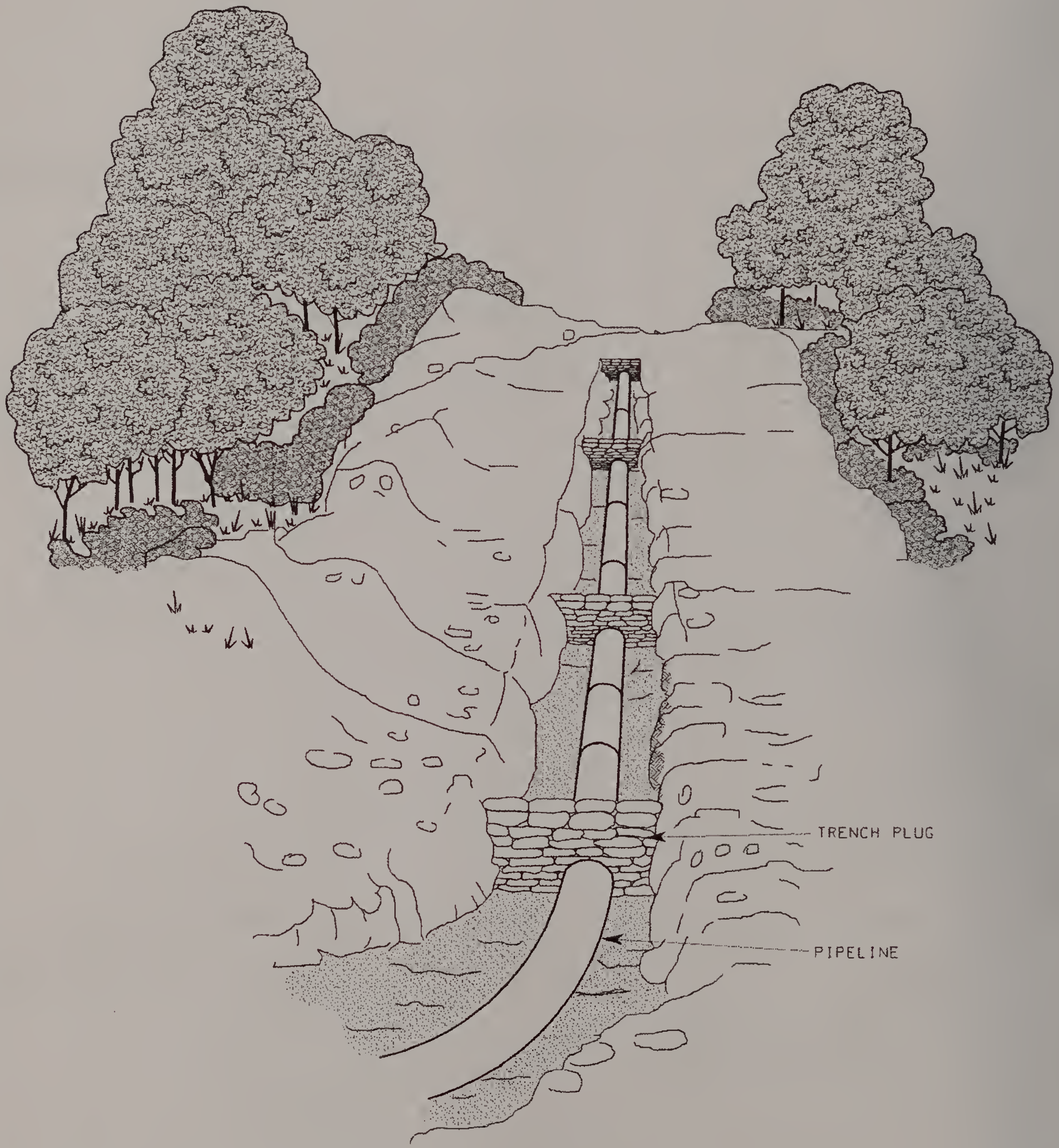
CROSS-SECTION

NOTES:

1. REMOVE DEWATERING STRUCTURE AS SOON AS POSSIBLE AFTER COMPLETION OF DEWATERING ACTIVITIES.

I.G. ESE0015. dgn

| | | |
|---|---|---|
| | FILTER BAG | FIGURE #15 |
| | | DWG. ES-0015 REV. |



| SLOPE (%) | SPACING (FT) |
|---|---|
| 5–15 | 300 |
| >15–30 | 200 |
| >30 | 100 |

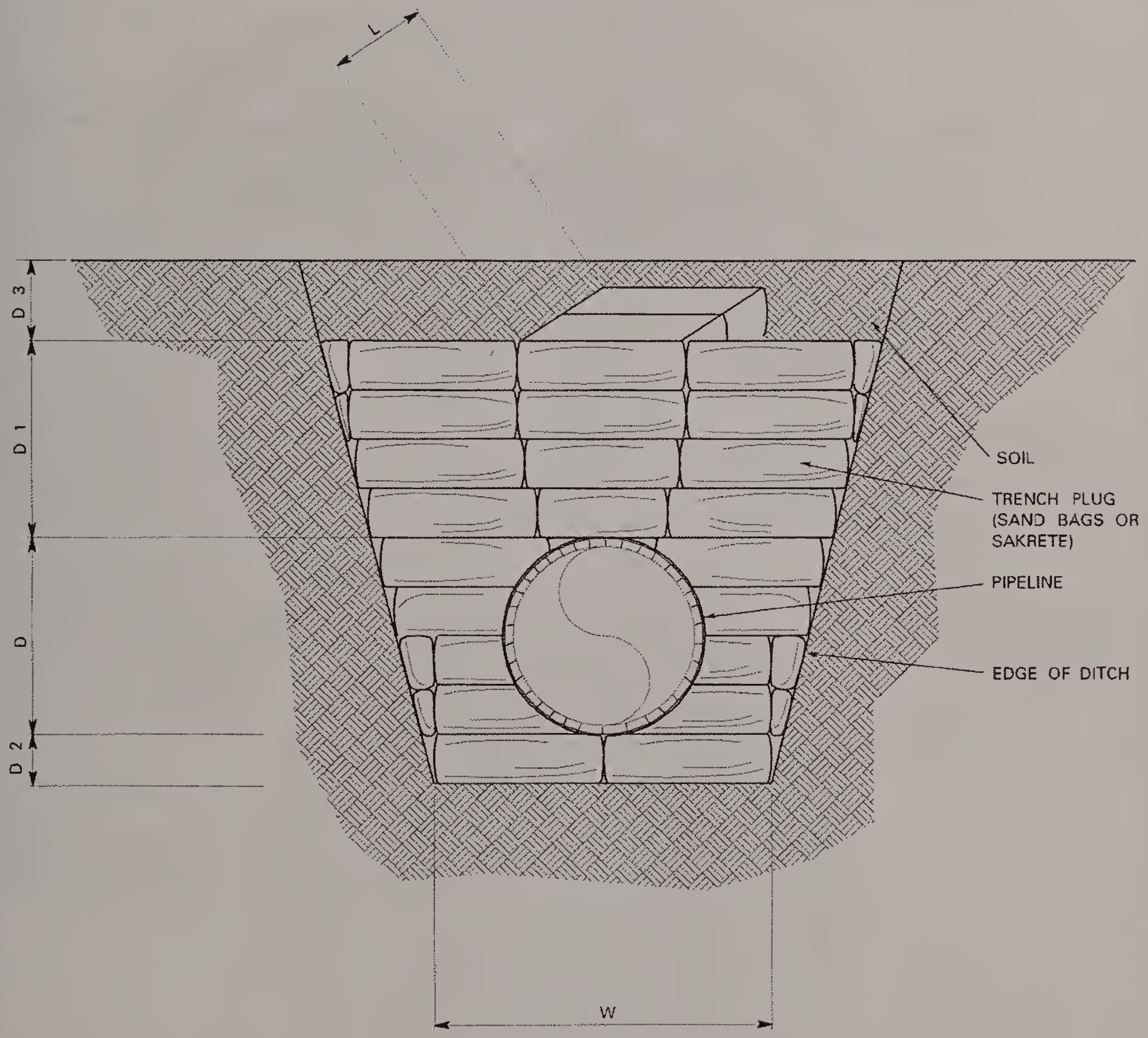
$$$$$USERNAME$$$$
$$$$$SYTIME$$$$$

I.G. ESE0016.DGN

## PERMANENT TRENCH PLUGS

FIGURE #16

DWG. ES–0016 REV.



D = PIPE DIAMETER
D1 = APPROXIMATELY 24"
D2 = APPROXIMATELY 6" (8" MIN. IN ROCK)
D3 = APPROXIMATELY 12"
W = D + 2 to 4 FEET
L = APPROXIMATELY 18" - 24"
D1 + D3 = 36" MINIMUM

NOTE:

USE OF SAKRETE SHALL REQUIRE PRIOR COMPANY APPROVAL.

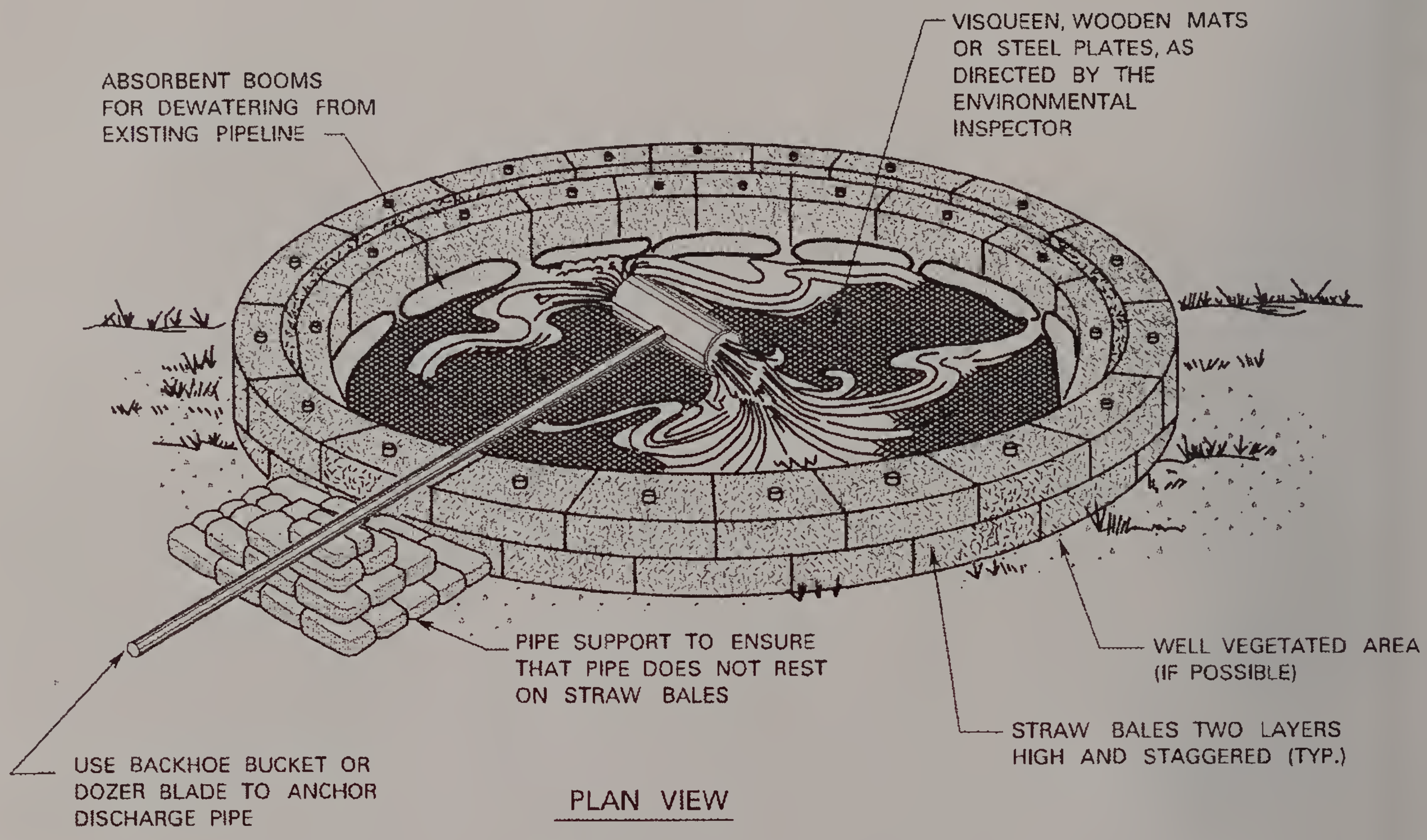
$$$$USERNAME$$$$
$$$$SYSTIME$$$$

I.C. ESE0017.DGN

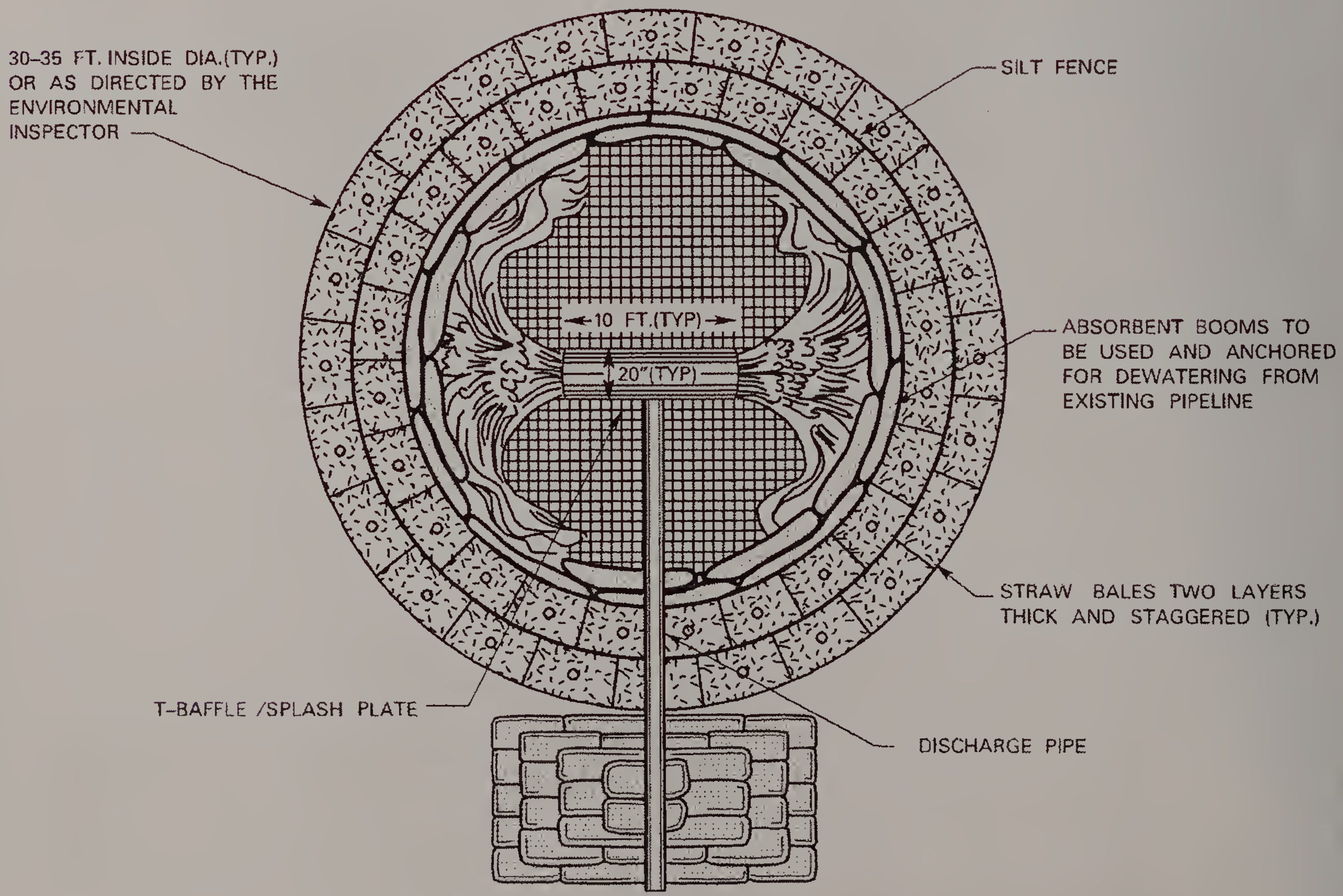
TRENCH PLUG DETAIL

FIGURE #17

DWG. ES-0017 REV.


VISQUEEN, WOODEN MATS OR STEEL PLATES, AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR
ABSORBENT BOOMS FOR DEWATERING FROM EXISTING PIPELINE
PIPE SUPPORT TO ENSURE THAT PIPE DOES NOT REST ON STRAW BALES
WELL VEGETATED AREA (IF POSSIBLE)
STRAW BALES TWO LAYERS HIGH AND STAGGERED (TYP.)
USE BACKHOE BUCKET OR DOZER BLADE TO ANCHOR DISCHARGE PIPE

PLAN VIEW


30–35 FT. INSIDE DIA.(TYP.) OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR
SILT FENCE
10 FT.(TYP)
20"(TYP)
ABSORBENT BOOMS TO BE USED AND ANCHORED FOR DEWATERING FROM EXISTING PIPELINE
STRAW BALES TWO LAYERS THICK AND STAGGERED (TYP.)
T-BAFFLE /SPLASH PLATE
DISCHARGE PIPE

TOP VIEW

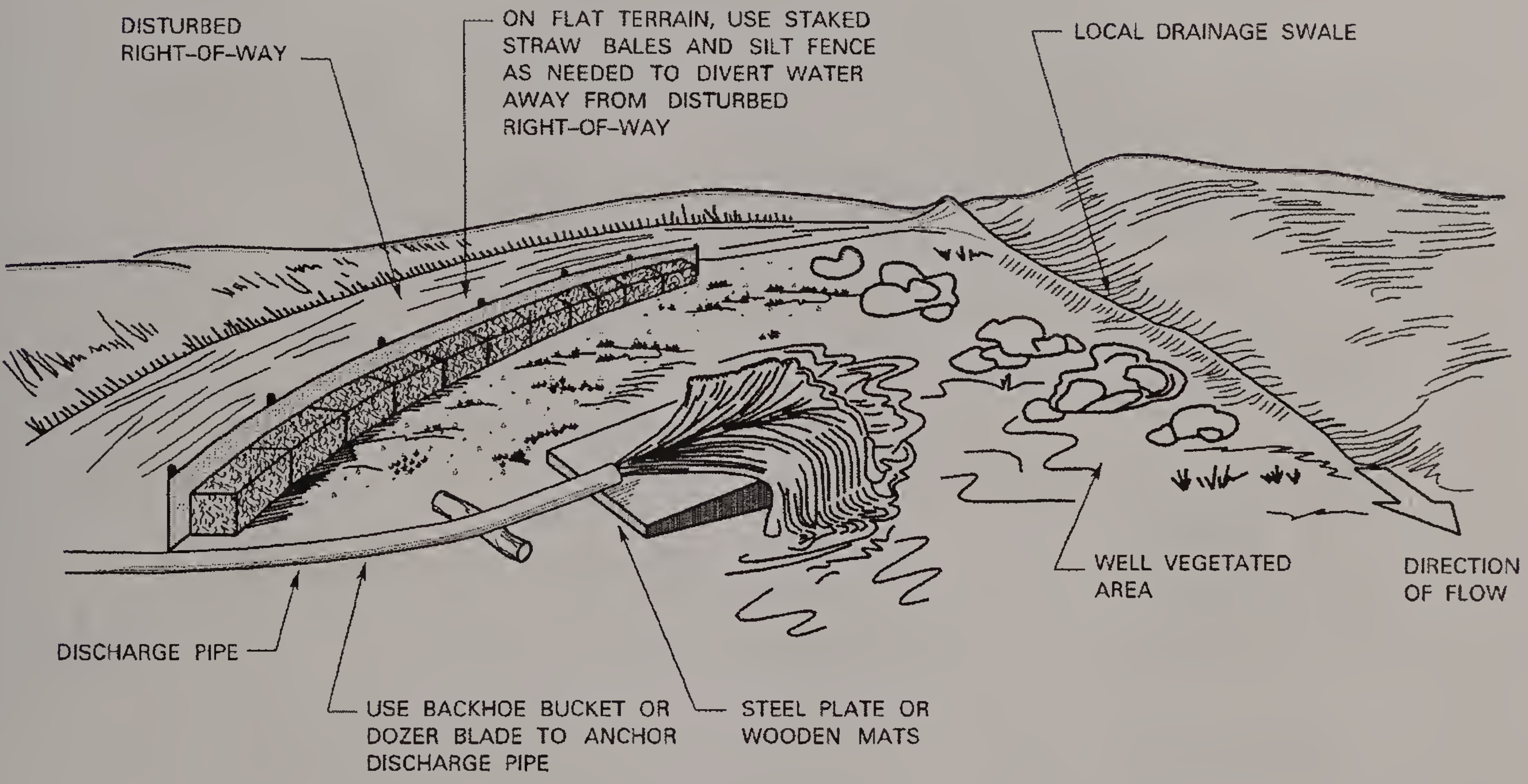
$$$$USERNAME$$$$
$$$$SYSTIME$$$$

I.G. ESE0018.DGN

DEWATERING STRUCTURE FOR
HYDROSTATIC TESTING

FIGURE #18

DWG. ES–0018 REV.


DISTURBED RIGHT-OF-WAY
ON FLAT TERRAIN, USE STAKED STRAW BALES AND SILT FENCE AS NEEDED TO DIVERT WATER AWAY FROM DISTURBED RIGHT-OF-WAY
LOCAL DRAINAGE SWALE
WELL VEGETATED AREA
DIRECTION OF FLOW
DISCHARGE PIPE
USE BACKHOE BUCKET OR DOZER BLADE TO ANCHOR DISCHARGE PIPE
STEEL PLATE OR WOODEN MATS

NOTE:

1. THIS DEWATERING STRUCTURE CAN ONLY BE USED FOR SMALL DISCHARGES FROM NEW PIPELINES WHEN A HYDROSTATIC TEST PACKAGE HAS NOT BEEN ISSUED. IT IS SUBJECT TO APPROVAL BY THE ENVIRONMENTAL INSPECTOR.

ALTERNATE
DEWATERING STRUCTURE FOR
HYDROSTATIC TESTING

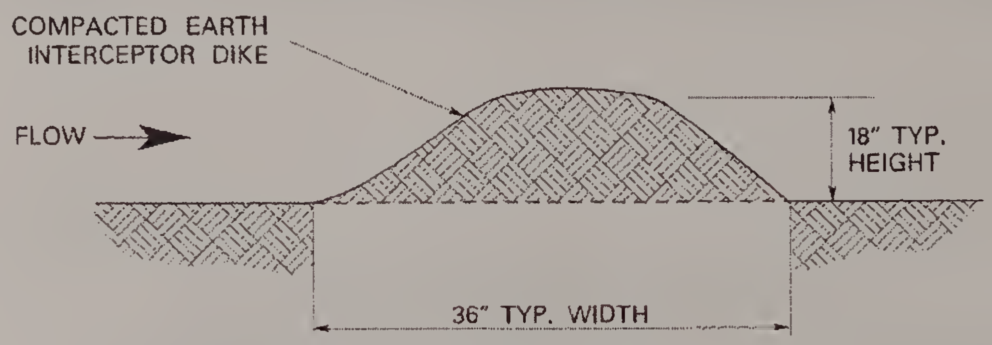
FIGURE #19

DWG. ES-0019

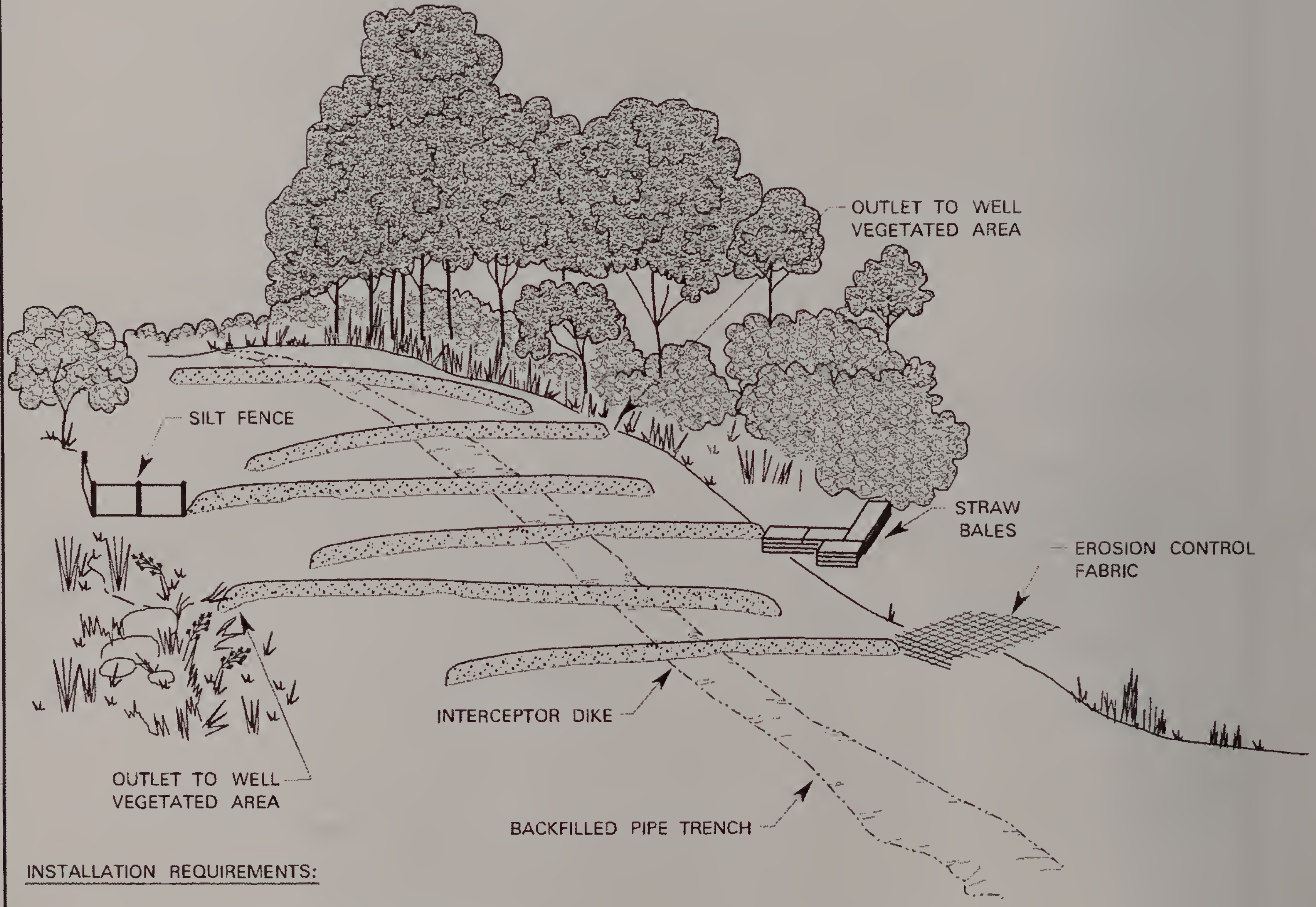
REV.

$$$$USERNAME$$$$
$$$$SYTIME$$$$

I.G. ESE0019.DGN



CROSS SECTION



INSTALLATION REQUIREMENTS:

- INSTALL IN ALL AREAS EXCEPT RESIDENTIAL OR AGRICULTURAL (UNLESS AUTHORIZED BY LANDOWNER OR LAND MANAGING AGENCY).
- CONSTRUCT USING EARTH FILLED SACKS OR STAKED STRAW BALES FOR TEMPORARY OR COMPACTED EARTH AND ROCK FOR PERMANENT.
- INSTALL WITH A 2 – 8% OUTFALL ANGLE.
- FOR TEMPORARY CHEVRON INTERCEPTOR DIKES, POSITION OUTFALL TO PREVENT SEDIMENT DISCHARGE INTO WETLANDS, WATERBODIES, OR OTHER SENSITIVE RESOURCES.
- FILTER RUN-OFF WATER BY CONSTRUCTING AN OUTLET USING AN ENERGY DISSIPATING DEVICE (SILT FENCE, STRAW BALES, EROSION CONTROL FABRIC), AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

MAINTENANCE REQUIREMENTS:

- INSPECT DURING AND FOLLOWING CONSTRUCTION AND MAKE REPAIRS AS NEEDED.
- KEEP THE CHANNEL FREE OF DEBRIS AND OBSTRUCTIONS.
- SEED AND MULCH PERMANENT INTERCEPTOR DIKES FOLLOWING CONSTRUCTION.

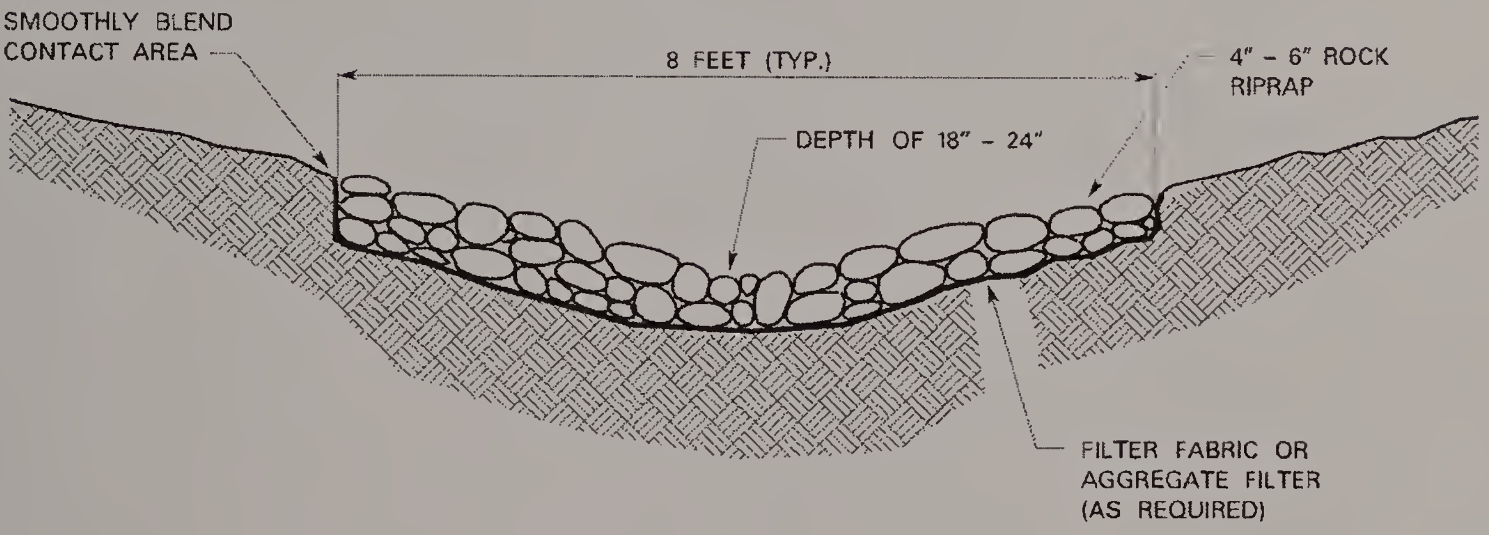
jwwhorley
01/22/2003

ESE0020.DGN
I.G.

CHEVRON INTERCEPTOR DIKE
INSTALLATION AND MAINTENANCE

FIGURE #20

DWG. ES–0020
REV.


SMOOTHLY BLEND CONTACT AREA
8 FEET (TYP.)
4" – 6" ROCK RIPRAP
DEPTH OF 18" – 24"
FILTER FABRIC OR AGGREGATE FILTER (AS REQUIRED)

INSTALLATION REQUIREMENTS:

1. RIPRAP CHANNELS CAN BE CONSTRUCTED WITH GRASS–LINED SLOPES WHERE SITE CONDITIONS WARRANT.
2. STABILIZE CHANNEL INLET POINTS AND INSTALL OUTLET PROTECTION (AS NEEDED) DURING CHANNEL INSTALLATION.
3. INSTALL ENERGY DISSIPATING DEVICE (AS NEEDED) TO PREVENT SCOUR TO THE RECEIVING OUTLET.
4. REMOVE ALL TREES, BRUSH, AND OTHER OBJECTIONABLE MATERIAL FROM THE CHANNEL.
5. INSTALL FILTER FABRIC OR GRAVEL LAYER TO PREVENT PIPING (AS REQUIRED)

MAINTENANCE REQUIREMENTS:

1. INSPECT CHANNEL DURING AND FOLLOWING CONSTRUCTION AND MAKE REPAIRS AS NEEDED.
2. KEEP THE CHANNEL FREE OF DEBRIS AND OBSTRUCTIONS.

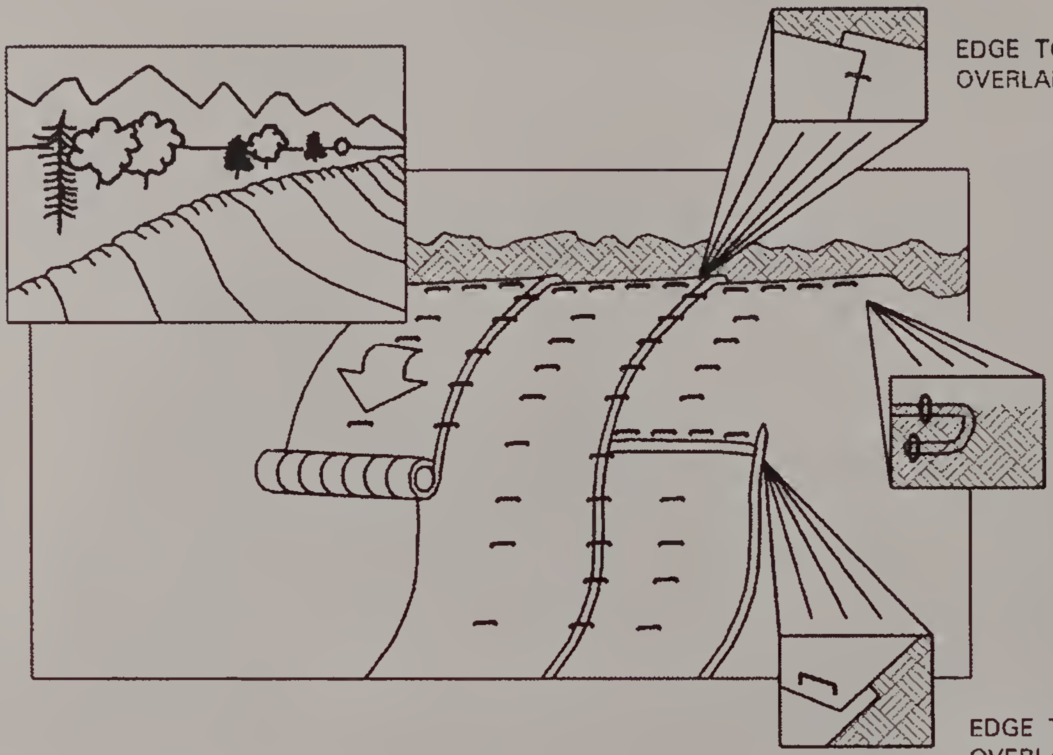
$$$$USERNAME$$$$
$$$$SYSTIME$$$$

I.C. ESE0021.DGN

ROCK LINED DRAINAGE SWALE
INSTALLATION AND MAINTENANCE

FIGURE #21

DWG. ES–0021 REV.



NOTES:

1. EROSION CONTROL MATTING (BLANKETS) SHALL BE USED AT LOCATIONS IDENTIFIED IN THE PLAN AND/OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

2. EROSION CONTROL MATTING SHALL MEET THE REQUIREMENTS SPECIFIED IN THE PLAN AND/OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

3. STAPLES SHALL BE MADE OF 11 GAUGE WIRE, U-SHAPED WITH 6" LEGS AND A 1" CROWN. STAPLES SHALL BE DRIVEN INTO THE GROUND FOR THE FULL LENGTH OF THE STAPLE LEGS.

4. MATTING SHALL BE INSTALLED ACCORDING TO MANUFACTURER SPECIFICATIONS OR AS STATED BELOW:
   - EXTEND TOP OF BLANKET 3 FEET PAST THE UPPER EDGE OF THE SLOPE.
   - ANCHOR ("KEY") THE UPPER EDGE OF THE BLANKET INTO THE SLOPE USING A 6" DEEP TRENCH AND ROLL THE BLANKET DOWN THE HILL. DOUBLE STAPLE EVERY 12" BEFORE BACKFILLING AND COMPACTING TRENCH.
   - AVOID STRETCHING EROSION CONTROL MATTING (LOOSELY) DURING INSTALLATION.
   - BRING MAT ROLL BACK OVER THE TOP OF THE TRENCH AND CONTINUE TO ROLL DOWN SLOPE. STAPLE EVERY 12" WHERE MAT EXITS THE TRENCH AT THE TOP OF THE SLOPE.
   - WHEN BLANKETS ARE SPLICED DOWN-SLOPE TO ADJOINING MATS (SLOPE OR STREAM BANK MATS), THE UPPER BLANKET SHALL BE PLACED OVER THE LOWER MAT (SHINGLE STYLE) WITH APPROXIMATELY 6" OF OVERLAP. STAPLE THROUGH THE OVERLAPPED AREA EVERY 12".
   - OVERLAP ADJACENT BLANKETS 6". STAPLE EDGES OF BLANKETS AND CENTER EVERY 36".

5. IN LIVESTOCK AREAS WHERE EROSION CONTROL MATTING IS APPLIED TO THE SLOPES, FENCING WILL BE USED IF NECESSARY TO EXCLUDE LIVESTOCK, WITH PERMISSION OF THE LANDOWNER.

6. MONITOR WASHOUTS, STAPLE INTEGRITY OR MAT MOVEMENT. REPLACE OR REPAIR AS NECESSARY.

$$$$$$USERNAME$$$$
$$$$$$SYSTIME$$$$$

I.G. ESE0022.DGN

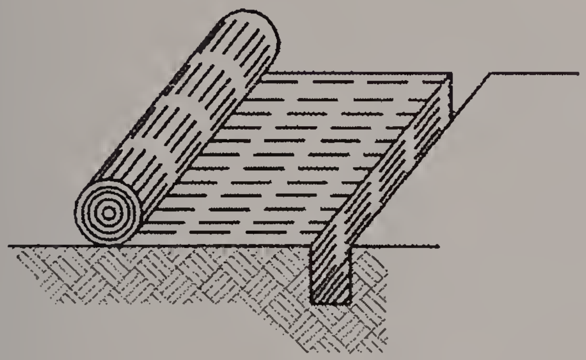
TYPICAL MATTING ON SLOPES

FIGURE #22

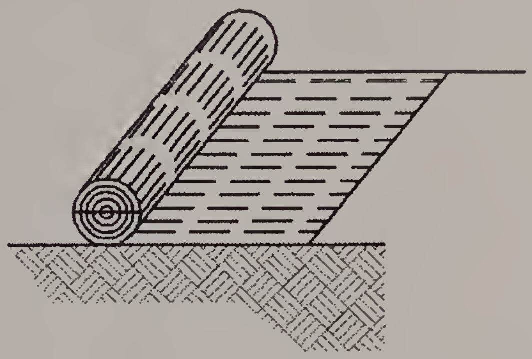
DWG. ES-0022

REV.

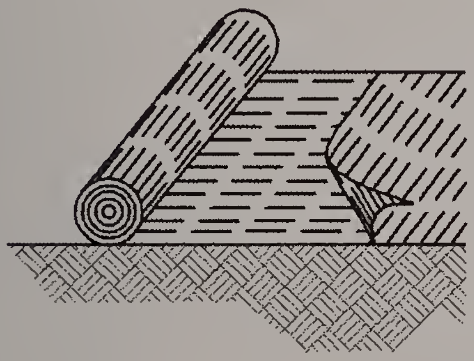
A. BURY THE TOP END OF THE JUTE STRIPS IN A 6" TRENCH (TYPICAL)



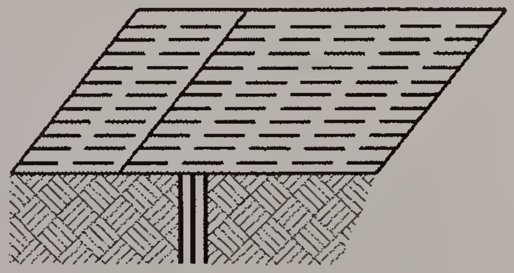
B. DOUBLE STAPLE EVERY 12" BEFORE BACKFILLING AND COMPACTING.

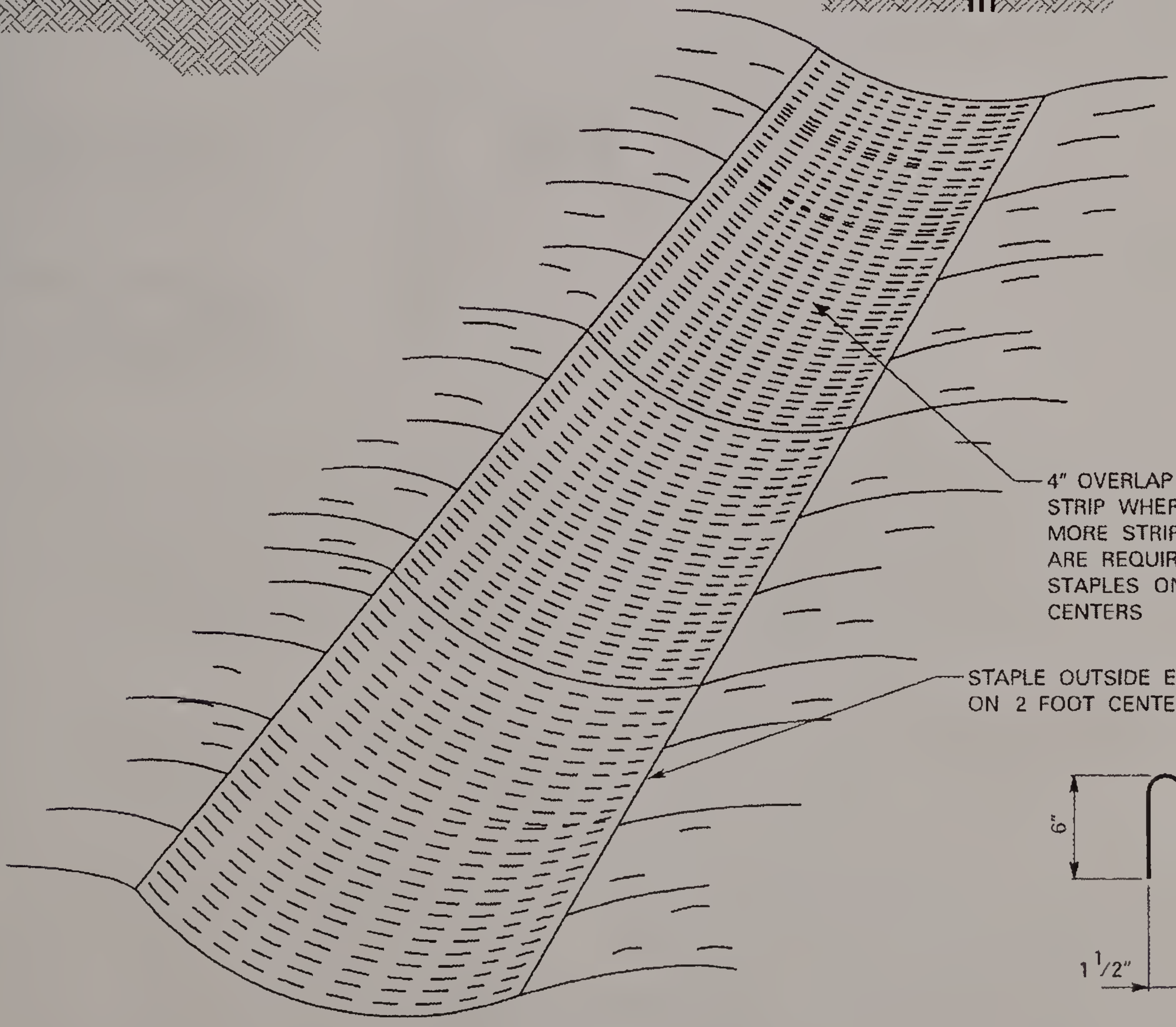


C. BURY AND TAMP UPPER END OF LOWER STRIP AS IN "A" AND "B". OVERLAP END OF TOP STRIP 4" AND STAPLE.



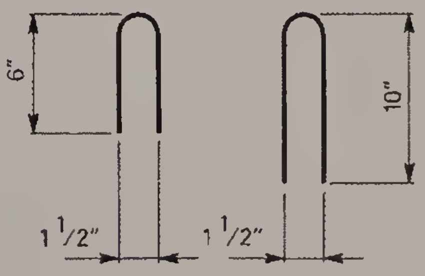
D. WHERE FABRIC STOPS, FOLD, BURY, AND TAMP JUTE STRIPS IN SLIT TRENCH. PROVIDE DOUBLE ROW OF STAPLES





4" OVERLAP OF JUTE STRIP WHERE TWO OR MORE STRIP WIDTHS ARE REQUIRED. STAPLES ON 18" CENTERS

STAPLE OUTSIDE EDGE ON 2 FOOT CENTERS



TYPICAL STAPLES

NO. 11 GAUGE WIRE

$$$$USERNAME$$$$
$$$$SYTIME$$$$$

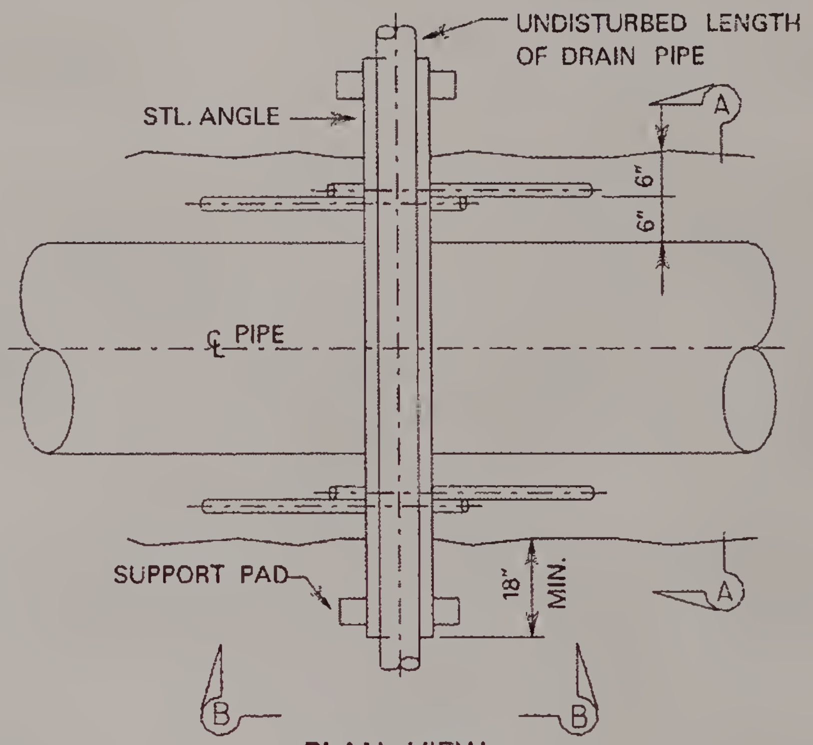
I.C. ESE0023. DGN

EROSION CONTROL FABRIC
INSTALLATION

FIGURE #23

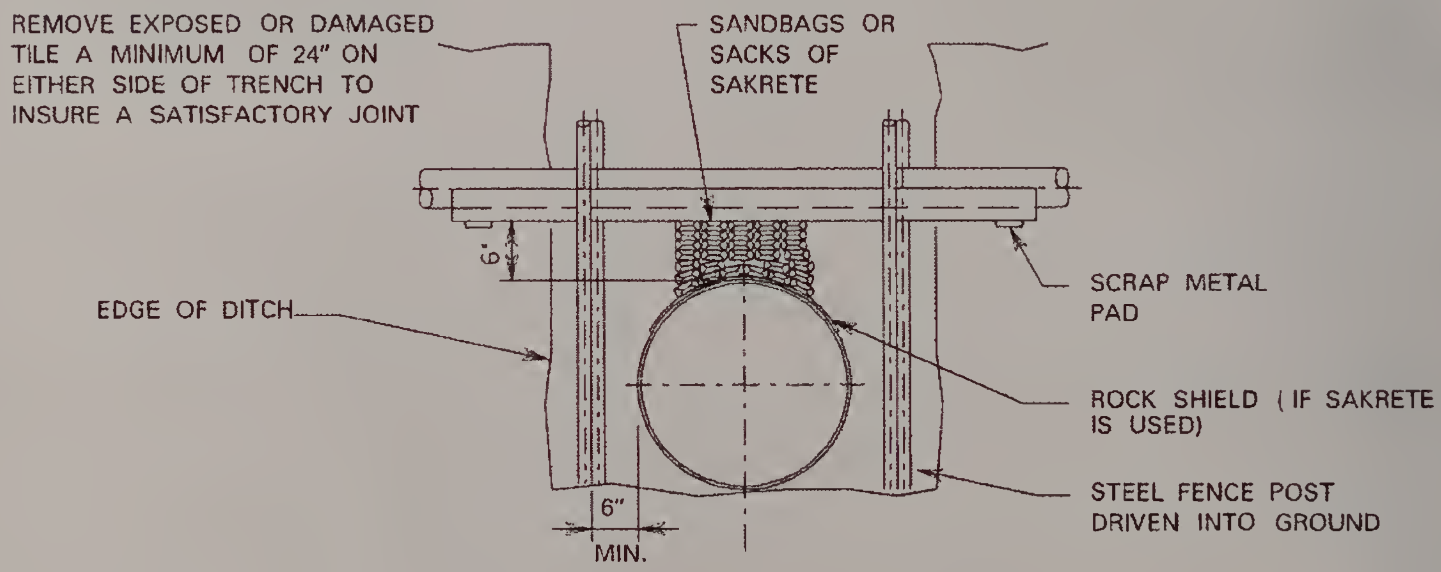
DWG. ES–0023

REV.



PLAN VIEW

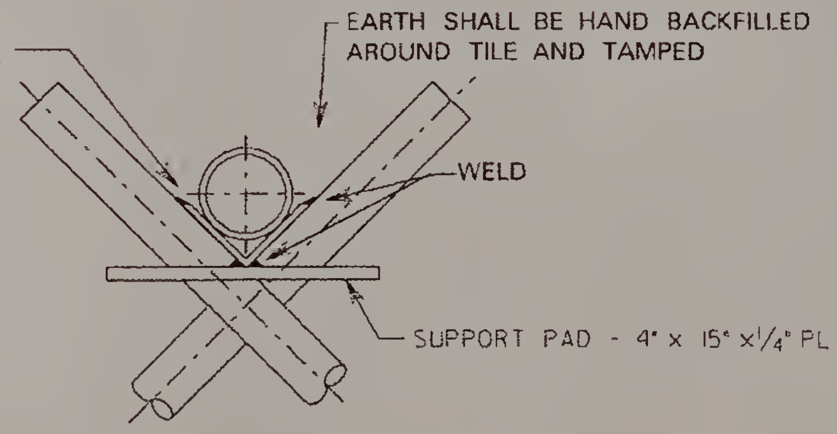
N.T.S.


REMOVE EXPOSED OR DAMAGED TILE A MINIMUM OF 24" ON EITHER SIDE OF TRENCH TO INSURE A SATISFACTORY JOINT
SANDBAGS OR SACKS OF SAKRETE
6"
EDGE OF DITCH
SCRAP METAL PAD
ROCK SHIELD (IF SAKRETE IS USED)
STEEL FENCE POST DRIVEN INTO GROUND
6" MIN.

SECTION "A–A"

N.T.S.

TO SUPPORT 4" & 6" TILE USE 4" x 1/4" ANGLE
" 8" " 6" x 7/16" "
" 10" " 6" x 7/16" "
" 12" " 8" x 1/2" "
" 16" " 8" x 1/2" "


EARTH SHALL BE HAND BACKFILLED AROUND TILE AND TAMPED
WELD
SUPPORT PAD - 4" x 15" x 1/4" PL

SECTION "B–B"

N.T.S.

NOTE:
USE OF SAKRETE SHALL REQUIRE PRIOR COMPANY APPROVAL.

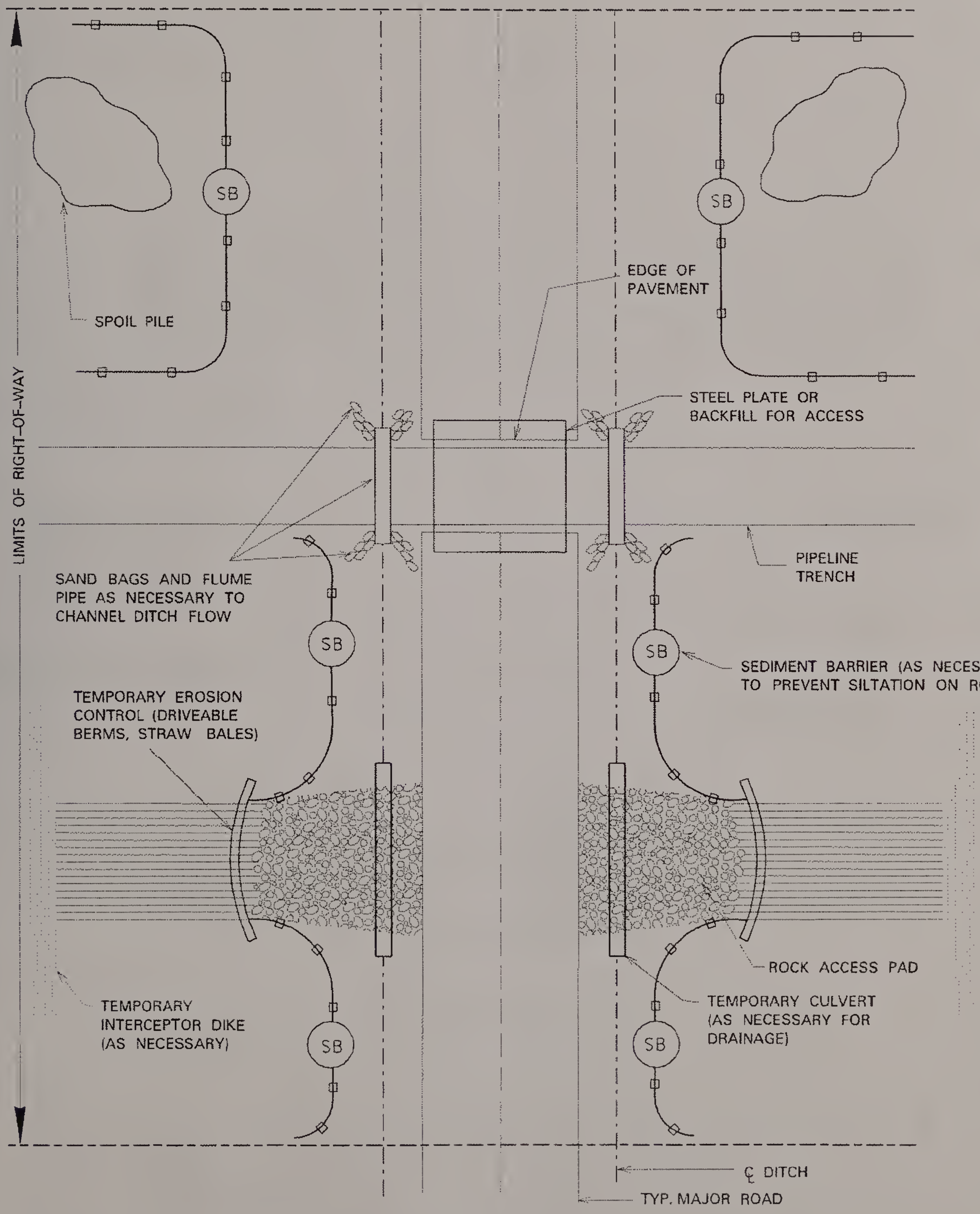
$$$$USERNAME$$$$
$$$$SYTIME$$$$

I.G. ESE0024.DGN

DRAIN TILE REPAIR
PROCEDURE

FIGURE #24

DWG. ES–0024 REV.


SPOIL PILE
SB
LIMITS OF RIGHT-OF-WAY
EDGE OF PAVEMENT
STEEL PLATE OR BACKFILL FOR ACCESS
SAND BAGS AND FLUME PIPE AS NECESSARY TO CHANNEL DITCH FLOW
PIPELINE TRENCH
SEDIMENT BARRIER (AS NECESSARY TO PREVENT SILTATION ON ROAD)
TEMPORARY EROSION CONTROL (DRIVEABLE BERMS, STRAW BALES)
ROCK ACCESS PAD
TEMPORARY CULVERT (AS NECESSARY FOR DRAINAGE)
TEMPORARY INTERCEPTOR DIKE (AS NECESSARY)
℄ DITCH
TYP. MAJOR ROAD

Ⓢ TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND / OR STRAW BALES

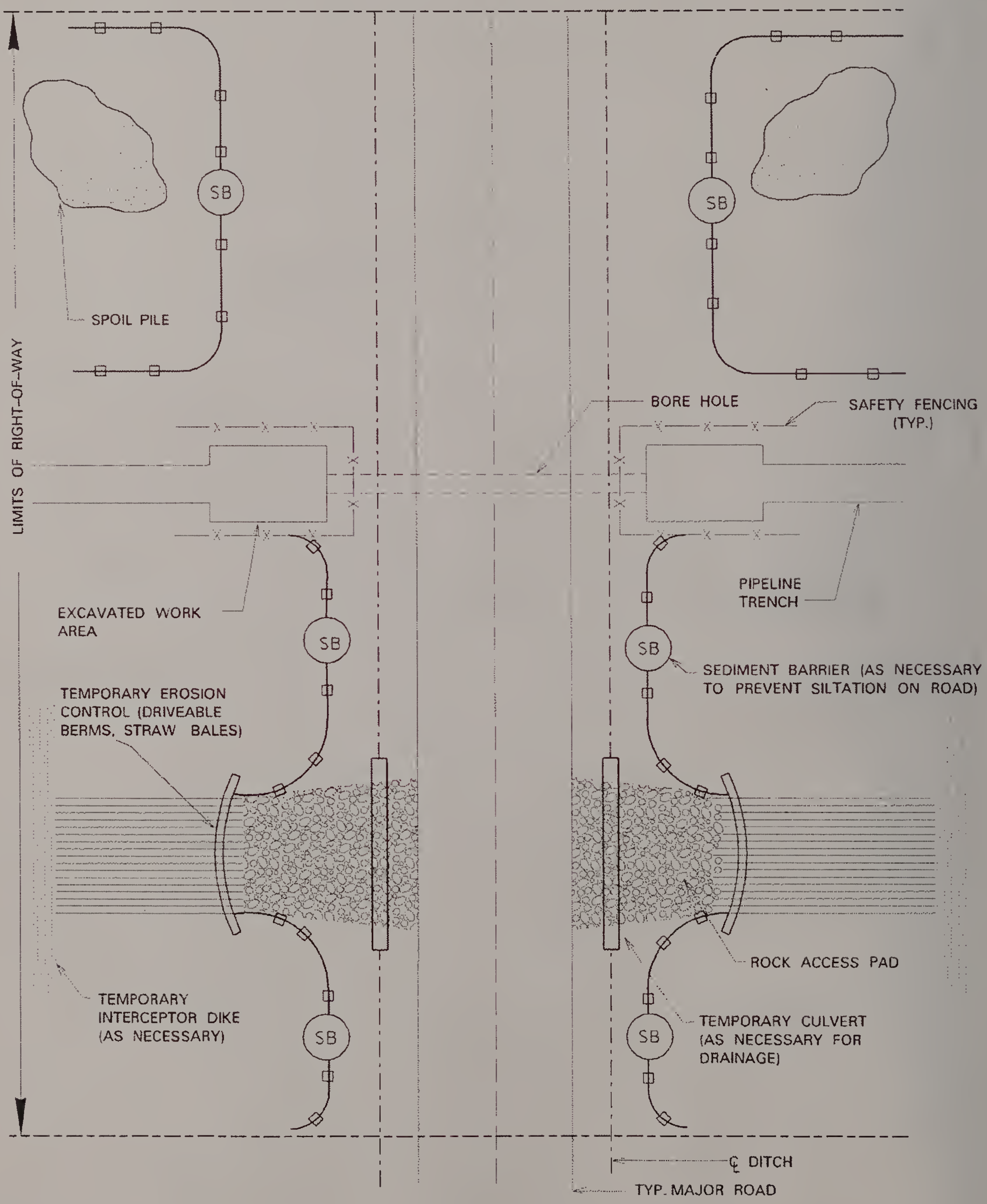
$$$$USERNAME$$$$
$$$$TIME$$$$

I.C. ESE0025.DGN

TYPICAL PAVED ROAD CROSSING
CONTROL MEASURES (OPEN CUT)

FIGURE #25

DWG. ES–0025 REV.


SB
SPOIL PILE
LIMITS OF RIGHT-OF-WAY
BORE HOLE
SAFETY FENCING (TYP.)
PIPELINE TRENCH
EXCAVATED WORK AREA
SEDIMENT BARRIER (AS NECESSARY TO PREVENT SILTATION ON ROAD)
TEMPORARY EROSION CONTROL (DRIVEABLE BERMS, STRAW BALES)
ROCK ACCESS PAD
TEMPORARY INTERCEPTOR DIKE (AS NECESSARY)
TEMPORARY CULVERT (AS NECESSARY FOR DRAINAGE)
℄ DITCH
TYP. MAJOR ROAD

(SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND / OR STRAW BALES

TYPICAL PAVED ROAD CROSSING
CONTROL MEASURES (BORED)

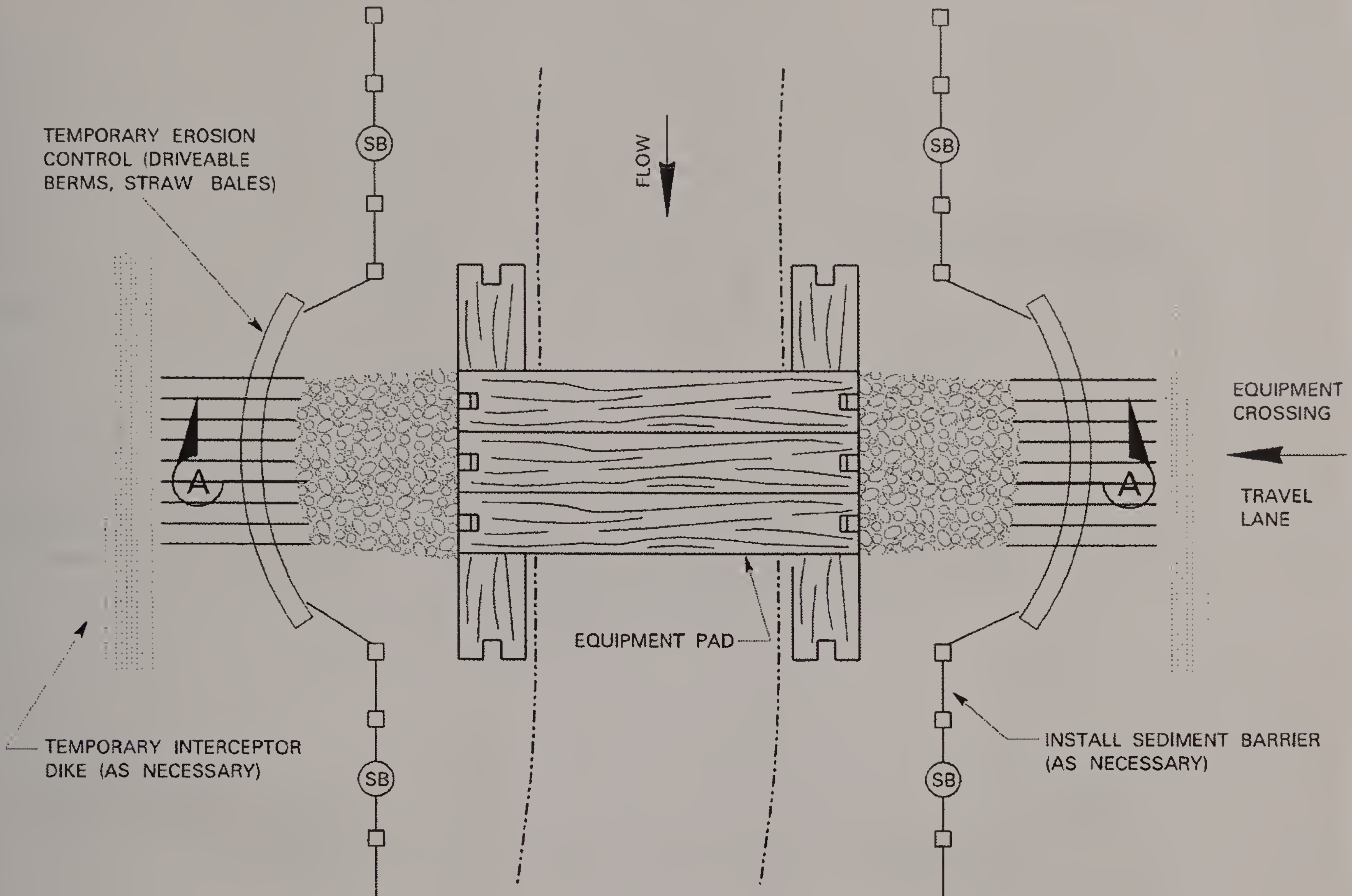
FIGURE #26

DWG. ES-0026

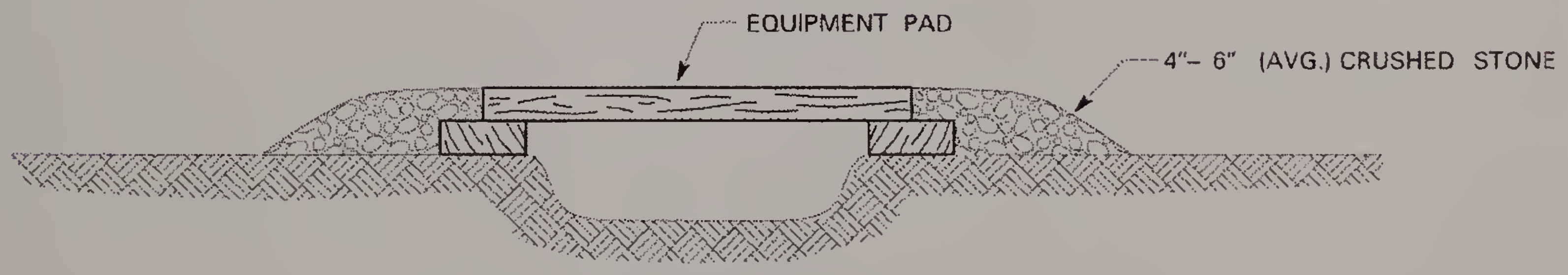
REV.

I.G. ESE0026.DGN

$$$$$USERNAME$$$$
$$$$$SYTIME$$$$$


TEMPORARY EROSION CONTROL (DRIVEABLE BERMS, STRAW BALES)
SB
FLOW
SB
EQUIPMENT CROSSING
TRAVEL LANE
A
A
EQUIPMENT PAD
TEMPORARY INTERCEPTOR DIKE (AS NECESSARY)
SB
SB
INSTALL SEDIMENT BARRIER (AS NECESSARY)

PLAN VIEW



SECTION "A–A"

NOTES:

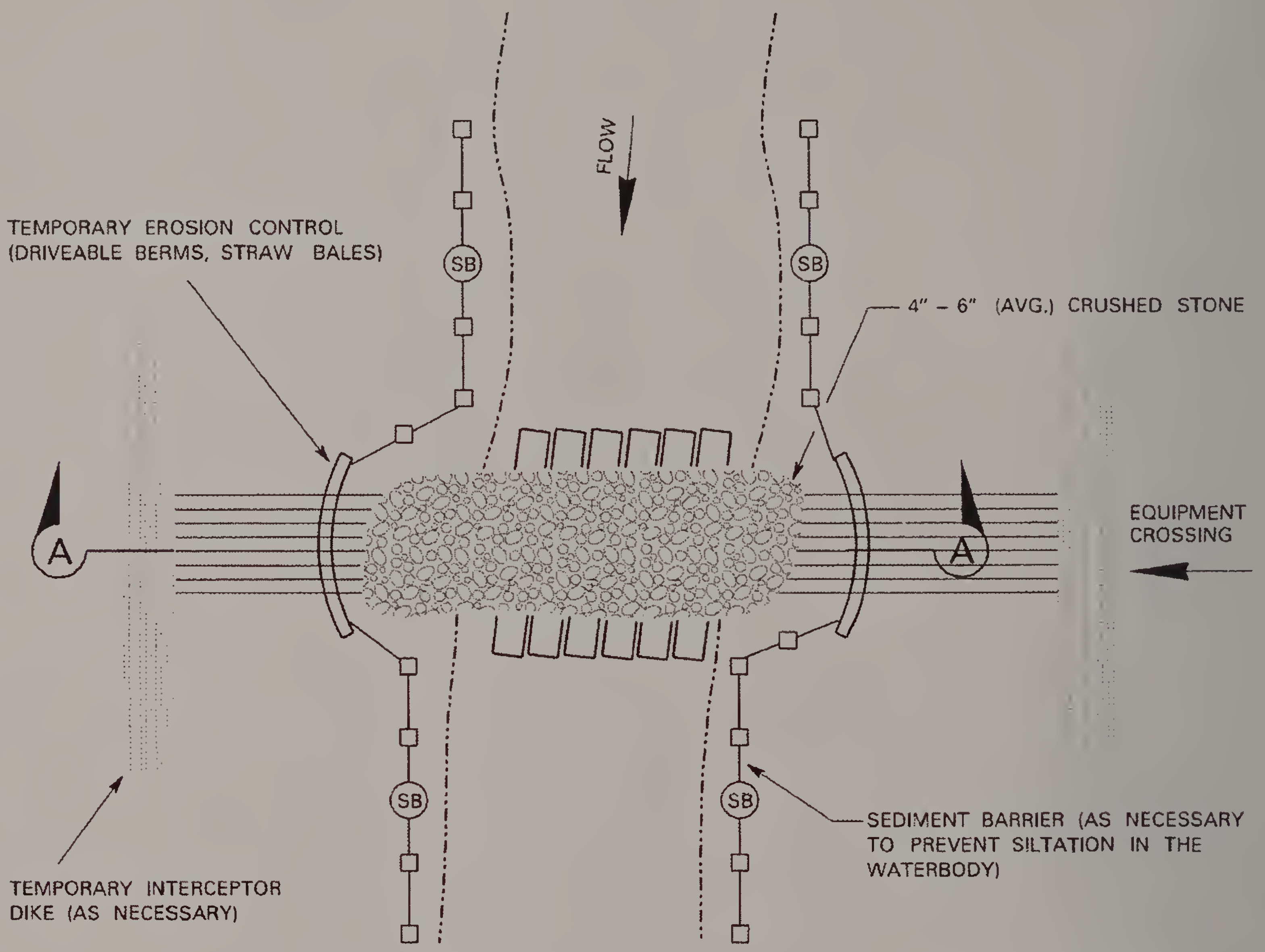
1. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/OR STRAW BALES, OR OTHER APPROPRIATE MATERIAL.
2. ADDITIONAL EQUIPMENT PADS CAN BE PUT SIDE BY SIDE IF EXTRA WIDTH IS REQUIRED.
3. EQUIPMENT PAD TYPICALLY CONSTRUCTED OF HARDWOOD; MUST ACCOMMODATE THE LARGEST EQUIPMENT USED.
4. CRUSHED STONE MUST EXTEND A MINIMUM OF 10 FEET FROM THE TOP OF THE BANK.
5. CONSTRUCT BRIDGE TO PREVENT SOIL FROM ENTERING WATERBODY.

I.G. ESE0027.DGN

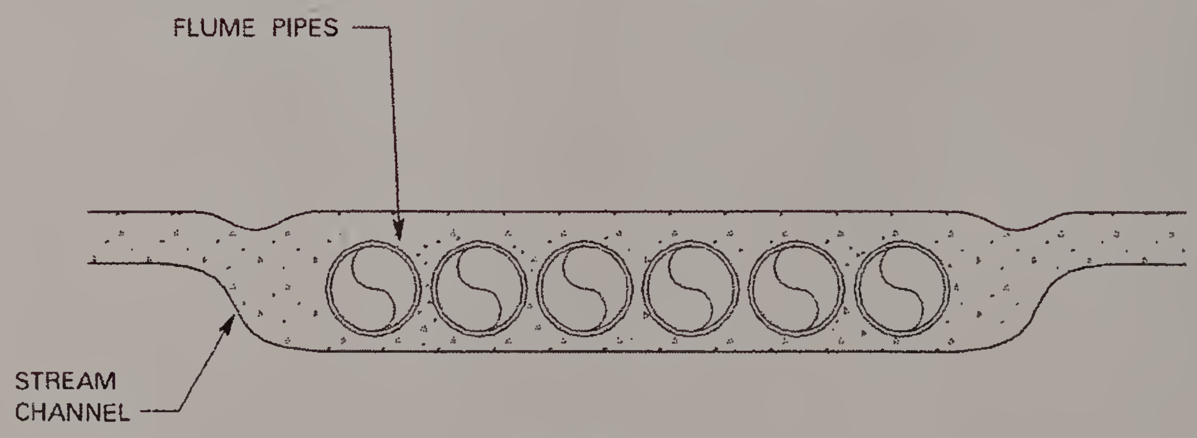
TEMPORARY EQUIPMENT BRIDGE
(EQUIPMENT PADS AND CULVERTS)

FIGURE #27

DWG. ES–0027 REV.


TEMPORARY EROSION CONTROL (DRIVEABLE BERMS, STRAW BALES)
FLOW
SB
4" – 6" (AVG.) CRUSHED STONE
A
EQUIPMENT CROSSING
A
TEMPORARY INTERCEPTOR DIKE (AS NECESSARY)
SB
SEDIMENT BARRIER (AS NECESSARY TO PREVENT SILTATION IN THE WATERBODY)

PLAN VIEW



SECTION "A–A"

jwwhorley
01/22/2003

NOTES:

1. ALIGN FLUME PIPES TO PREVENT EROSION AND STREAMBED SCOUR.
2. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCES AND/OR STRAW BALES, OR OTHER APPROPRIATE MATERIALS.

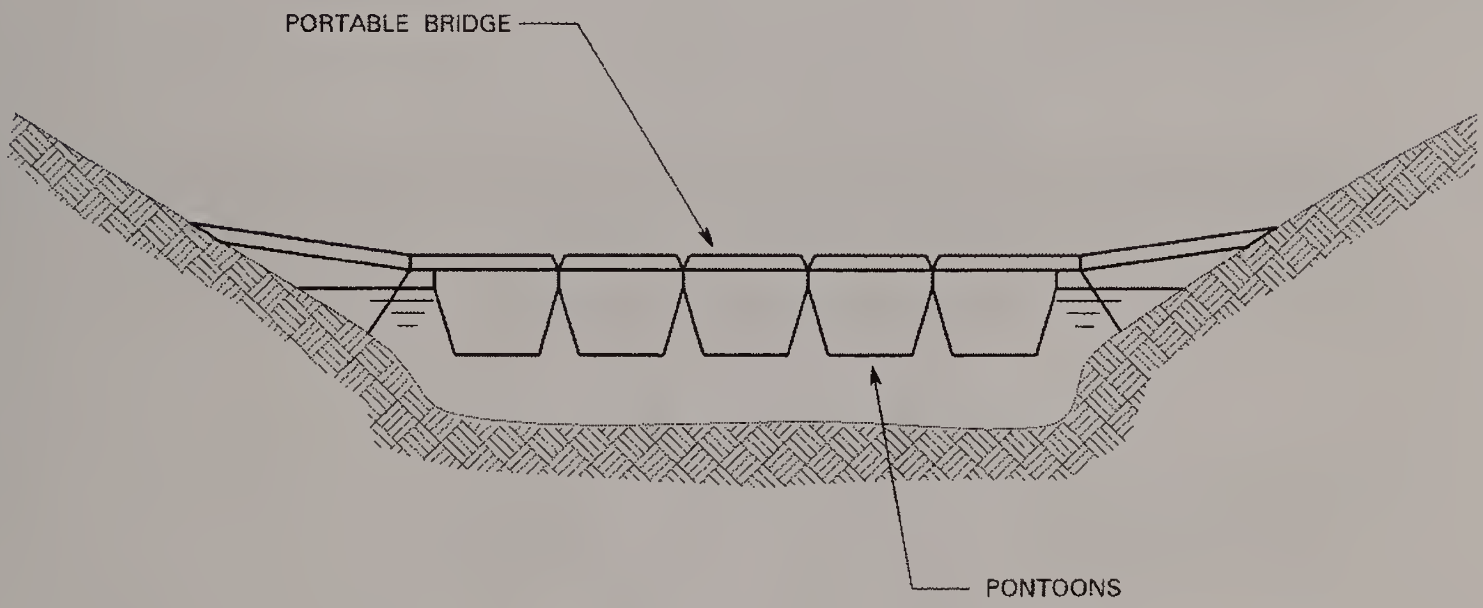
I.G. ESE0028.DGN

## TEMPORARY EQUIPMENT BRIDGE (CRUSHED STONE AND CULVERTS)

FIGURE #28

DWG. ES–0028

REV.



NOTES:

1. STABILIZE EDGES WITH SANDBAGS OR STONE.

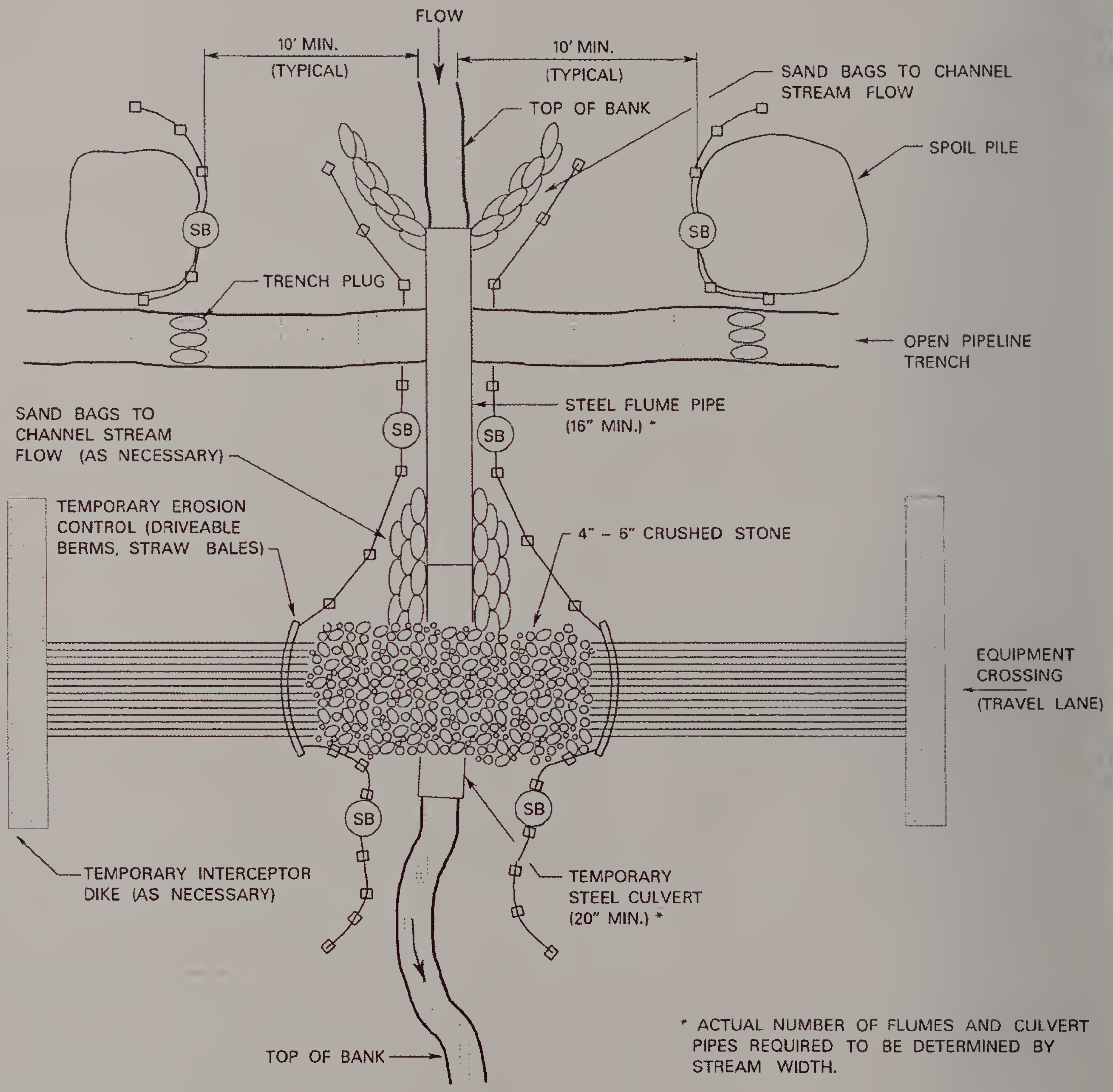
2. REMOVE BRIDGE DURING CLEANUP.

I.G. ESE0029.DGN

TEMPORARY EQUIPMENT BRIDGE
(FLEXI-FLOAT OR PORTABLE)

FIGURE #29

DWG. ES-0029 REV.


FLOW
10' MIN. (TYPICAL)
10' MIN. (TYPICAL)
TOP OF BANK
SAND BAGS TO CHANNEL STREAM FLOW
SPOIL PILE
SB
SB
TRENCH PLUG
OPEN PIPELINE TRENCH
SAND BAGS TO CHANNEL STREAM FLOW (AS NECESSARY)
SB
SB
STEEL FLUME PIPE (16" MIN.) *
TEMPORARY EROSION CONTROL (DRIVEABLE BERMS, STRAW BALES)
4" – 6" CRUSHED STONE
EQUIPMENT CROSSING (TRAVEL LANE)
SB
SB
TEMPORARY INTERCEPTOR DIKE (AS NECESSARY)
TEMPORARY STEEL CULVERT (20" MIN.) *
TOP OF BANK

* ACTUAL NUMBER OF FLUMES AND CULVERT PIPES REQUIRED TO BE DETERMINED BY STREAM WIDTH.

NOTES:

1. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/OR STRAW BALES, OR OTHER APPROPRIATE MATERIALS.
2. SAND BAGS MUST BE FILLED WITH SAND FREE OF SILT, ORGANICS, AND OTHER MATERIAL.
3. ALIGN FLUME(S) TO PREVENT BANK EROSION AND STREAM SCOUR.
4. CONDUCT ALL IN-STREAM ACTIVITY (EXCEPT BLASTING OR OTHER ROCK BREAKING MEASURES) WITH THE FLUME(S) IN PLACE. FLUME PIPE(S) MAY NOT BE REMOVED FOR LOWERING IN OR INITIAL STREAMBED RESTORATION EFFORTS.
5. THE ENDS OF THE FLUME AND CULVERT MUST EXTEND TO AN UNDISTURBED AREA.

jwhorl
01/22/2003

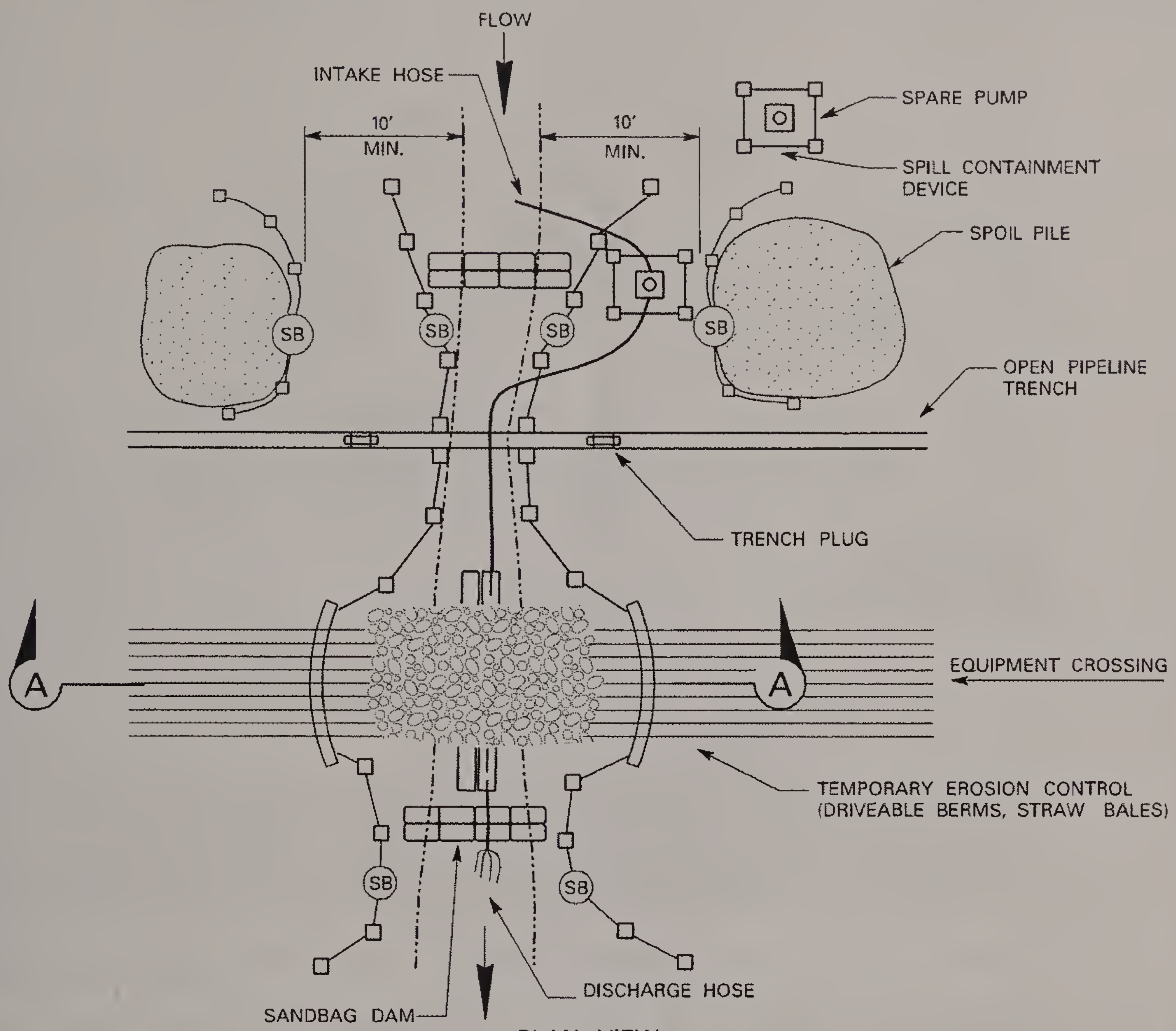
I.G. ESE0030.DGN

TYPICAL FLUMED CROSSING

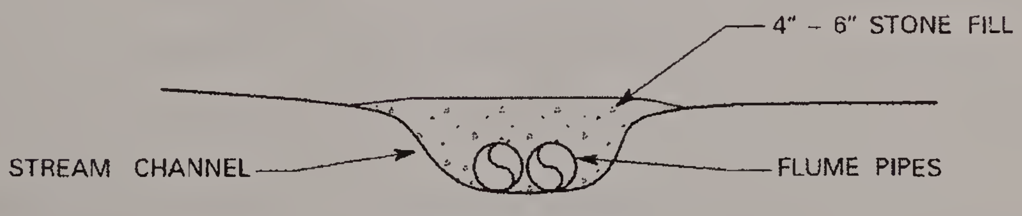
FIGURE #30

DWG. ES–0030

REV.



PLAN VIEW



SECTION "A-A"

NOTES:

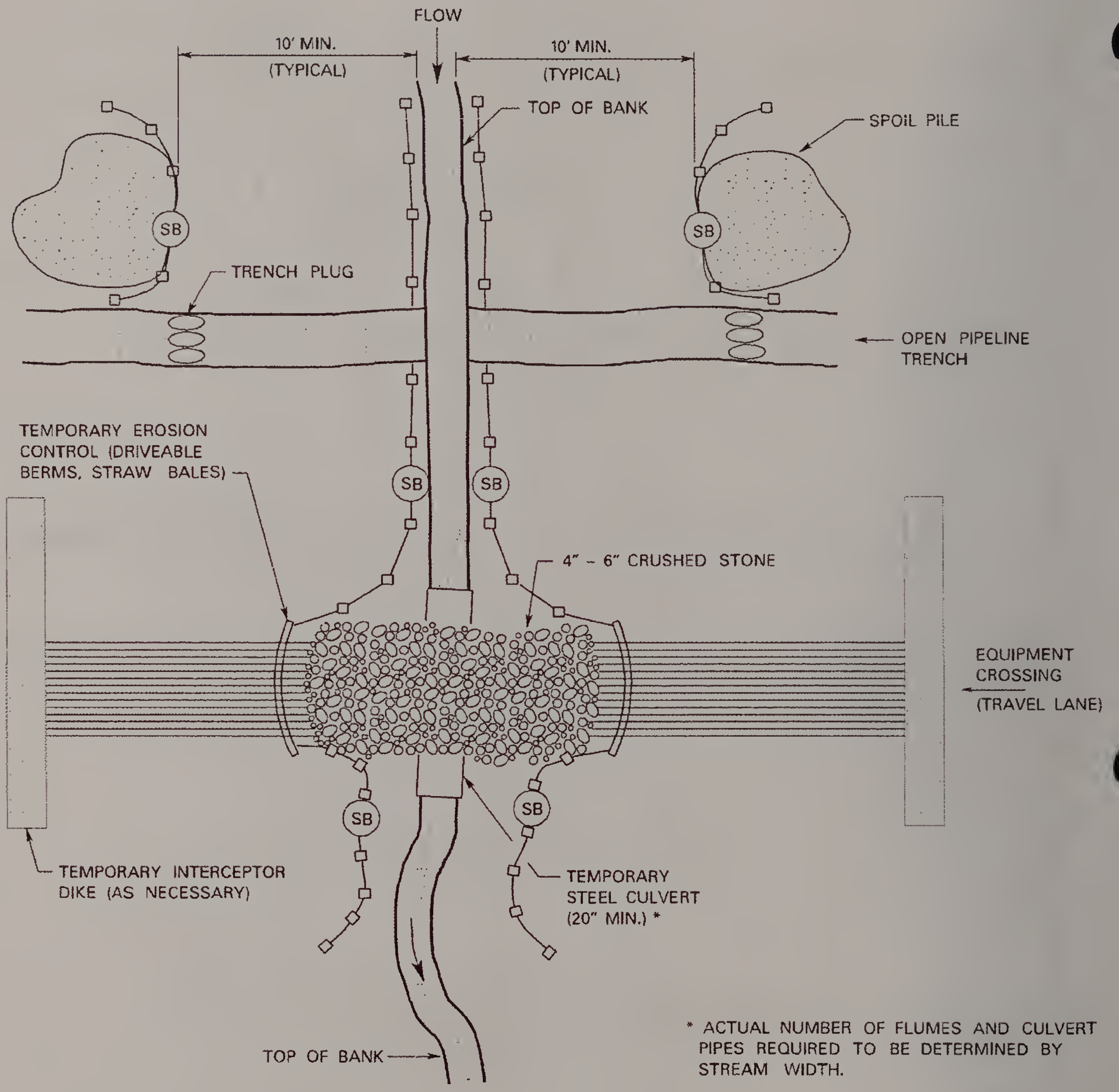
1. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/OR STRAW BALES, OR OTHER APPROPRIATE MATERIALS
2. INSTALL AND SEAL SANDBAGS UPSTREAM AND DOWNSTREAM OF THE CROSSING.
3. CREATE AN UPSTREAM SUMP USING SANDBAGS IF NATURAL SUMP IS UNAVAILABLE FOR THE INTAKE HOSE.
4. EXCAVATE ACROSS STREAM CHANNEL FOLLOWING WATER REROUTING.
5. DO NOT REFUEL OR STORE FUEL WITHIN 100 FEET OF THE WATERBODY, WHERE FEASIBLE.
6. MONITOR PUMPS AT ALL TIMES DURING STREAM CROSSING PROCEDURE.
7. USE SUFFICIENT PUMPS, INCLUDING ONSITE BACKUP PUMPS, TO MAINTAIN DOWNSTREAM FLOW.
8. SCREEN PUMP INTAKES.
9. NUMBER OF FLUME PIPES FOR EQUIPMENT BRIDGE WILL VARY DEPENDING ON SITE CONDITIONS.

I.G.
ESE0031.DGN

TYPICAL DAM AND PUMP
CROSSING

FIGURE #31

DWG. ES–0031
REV.


FLOW
10' MIN. (TYPICAL)
10' MIN. (TYPICAL)
TOP OF BANK
SPOIL PILE
SB
TRENCH PLUG
OPEN PIPELINE TRENCH
TEMPORARY EROSION CONTROL (DRIVEABLE BERMS, STRAW BALES)
4" – 6" CRUSHED STONE
EQUIPMENT CROSSING (TRAVEL LANE)
TEMPORARY INTERCEPTOR DIKE (AS NECESSARY)
TEMPORARY STEEL CULVERT (20" MIN.) *
TOP OF BANK

* ACTUAL NUMBER OF FLUMES AND CULVERT PIPES REQUIRED TO BE DETERMINED BY STREAM WIDTH.

NOTES:

1. (SB) TEMPORARY SEDIMENT BARRIER OF SILT FENCE AND/OR STRAW BALES, OR APPROPRIATE MATERIALS.
2. FOR MINOR WATERBODIES, COMPLETE TRENCHING AND BACKFILLING IN THE WATERBODY (NOT INCLUDING BLASTING OR OTHER ROCK BREAKING MEASURES) WITHIN 24 CONTINUOUS HOURS. IF A FLUME IS INSTALLED WITHIN THE WATERBODY DURING MAINLINE ACTIVITIES, IT CAN BE REMOVED JUST PRIOR TO LOWERING IN THE PIPELINE. THE 24-HOUR TIMEFRAME STARTS AS SOON AS THE FLUME IS REMOVED.
3. FOR INTERMEDIATE WATERBODIES, COMPLETE TRENCHING AND BACKFILLING IN THE WATERBODY (NOT INCLUDING BLASTING OR OTHER ROCK BREAKING MEASURES) WITHIN 48 CONTINUOUS HOURS, IF FEASIBLE.

wwhorley
01/22/2003

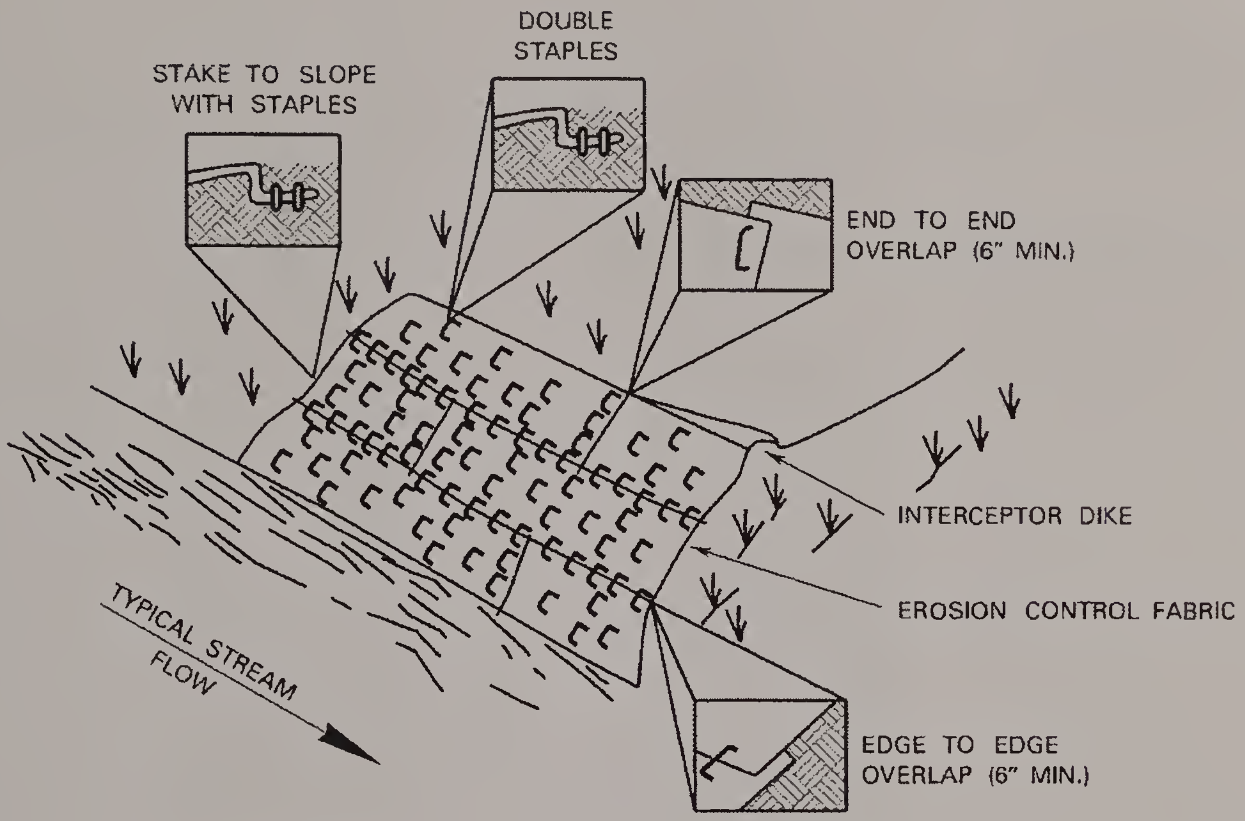
I.G. ESE0032.DGN

TYPICAL WET CROSSING

FIGURE #32

DWG. ES–0032

REV.


DOUBLE STAPLES
STAKE TO SLOPE WITH STAPLES
END TO END OVERLAP (6" MIN.)
INTERCEPTOR DIKE
EROSION CONTROL FABRIC
TYPICAL STREAM FLOW
EDGE TO EDGE OVERLAP (6" MIN.)

NOTES:

1. EROSION CONTROL MATTING SHALL BE PLACE ON THE BANKS OF FLOWING STREAMS WHERE VEGETATION HAS BEEN REMOVED OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

2. EROSION CONTROL MATTING SHALL MEET THE REQUIREMENTS SPECIFIED IN THE PLAN AND/OR AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

3. STAPLES SHALL BE MADE OF 11 GAUGE WIRE, U-SHAPED WITH 6" LEGS AND A 1" CROWN. STAPLES SHALL BE DRIVEN INTO THE GROUND FOR THE FULL LENGTH OF THE STAPLE LEGS. ALTERNATELY 1" WOODEN PEGS 6" LONG AND BEVELED TO SECURE MATTING.

4. MATTING SHALL BE INSTALLED ACCORDING TO MANUFACTURER SPECIFICATIONS OR AS STATED BELOW:

   - EXTEND TOP OF BLANKET 2 FEET PAST THE UPPER EDGE OF THE HIGH WATER MARK. IF AN INTERCEPTOR DIKE IS PRESENT ON THE APPROACH SLOPE, BEGIN THE BLANKET ON THE UPHILL SIDE OF THE INTERCEPTOR DIKE.
   - INSTALL BLANKET(S) ACROSS THE SLOPE IN THE DIRECTION OF THE WATER FLOW.
   - ANCHOR ("KEY") THE UPSTREAM EDGE OF THE BLANKET(S) INTO THE SLOPE USING A 6" DEEP TRENCH. DOUBLE STAPLE EVERY 12" BEFORE BACKFILLING AND COMPACTING TRENCH
   - ANCHOR (KEY") THE UPPER EDGE OF THE BLANKET INTO THE SLOPE USING A 6" DEEP TRENCH. DOUBLE STAPLE EVERY 12" BEFORE BACKFILLING AND COMPACTING TRENCH.
   - OVERLAP THE EDGES OF PARALLEL BLANKETS A MINIMUM OF 6". PLACE THE UPPER BLANKET OVER THE LOWER BLANKET (SHINGLE STYLE) AND STAPLE EVERY 12" ALONG THE LENGTH OF THE EDGE.
   - WHEN BLANKET ENDS ARE ADJOINED, PLACE THE UPSTREAM BLANKET OVER THE DOWNSTREAM BLANKET (SHINGLE STYLE) WITH APPROXIMATELY 6" OF OVERLAP AND STAPLE THROUGH THE OVERLAPPED AREA EVERY 12".
   - STAPLE DOWN THE CENTER OF THE BLANKET(S), THREE STAPLES IN EVERY SQUARE YARD.

5. IN LIVESTOCK AREAS WHERE EROSION CONTROL MATTING IS APPLIED TO THE STREAMBANKS, FENCING WILL BE USED IF NECESSARY TO EXCLUDE LIVESTOCK, WITH PERMISSION OF THE LANDOWNER.

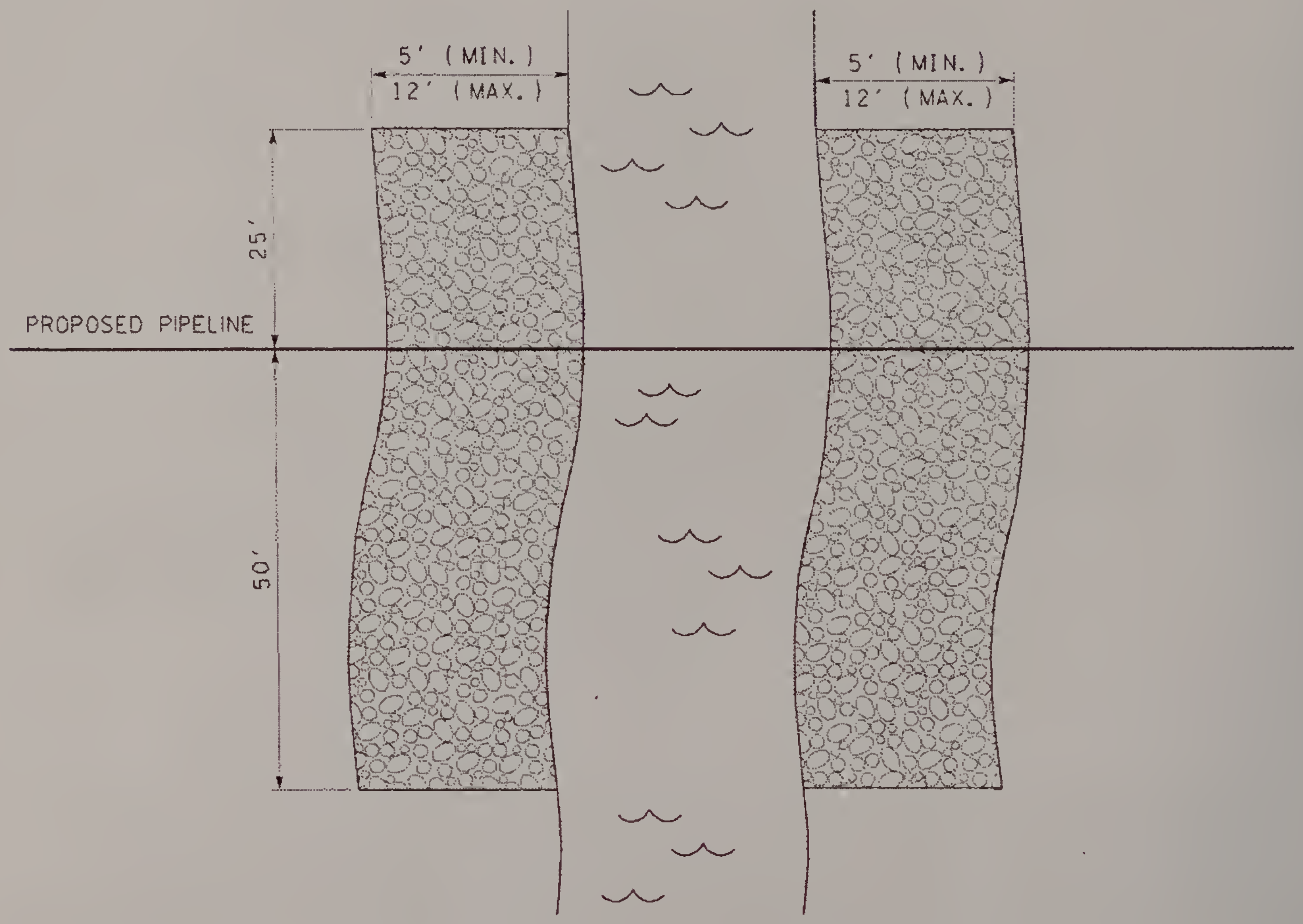
6. MONITOR WASHOUTS, STAPLE INTEGRITY OR MAT MOVEMENT. REPLACE OR REPAIR AS NECESSARY.

I.G. ESE0033.DGN

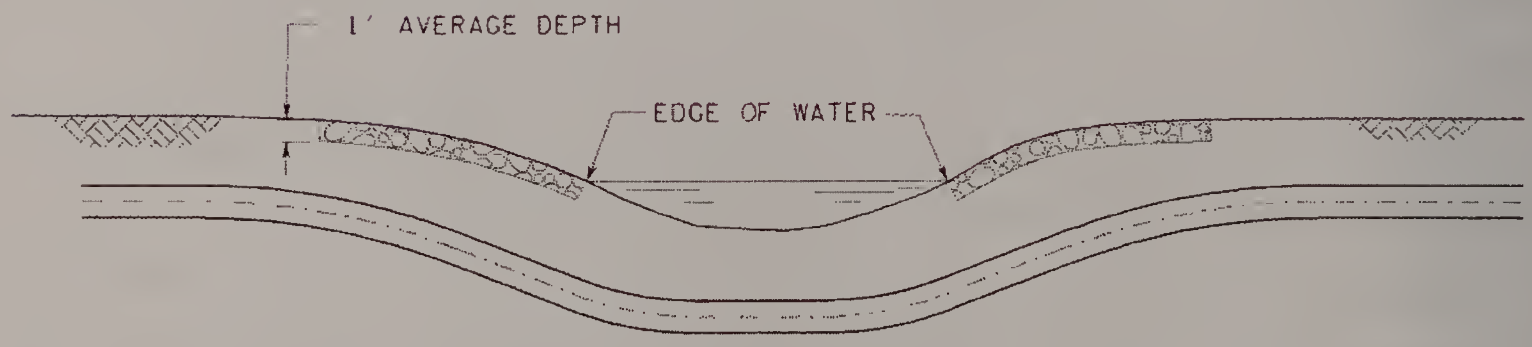
TYPICAL MATTING OF STREAMBANKS

FIGURE #33

DWG. ES–0033 REV.



PLAN



SECTION

NOTES:

1. RIP-RAP IS LESS THAN 500 FEET IN LENGTH.
2. RIP-RAP WILL NOT EXCEED AN AVERAGE OF ONE CUBIC YARD PER RUNNING FOOT.
3. RIP-RAP INSTALLATION SHALL BE IN COMPLIANCE WITH ALL APPLICABLE PERMITS.

jwhurley
01/23/2002

I.G. ese0034. dgn

RIP–RAP PLACEMENT
(TYPICAL)

FIGURE #34

DWG. ES–0034 REV.

# APPENDIX B

# SEED MIX RECOMMENDATIONS

# SEED MIX RECOMMENDATIONS

## *“NORTHERN ZONE”*[1]

### UPLAND AREAS

| | |
|---|---|
| Lime | 4.0 tons/acre |
| Fertilizer | 1000 lbs./acre (10-20-20) |
| Mulch (Wheat Straw) | 3.0 tons/acre |

1. **Upland Seed Mix**

| **Upland Seed Mix** | 75 lbs./acre Pure Live Seed (PLS) |
|---|---|
| Kentucky Bluegrass | 20% |
| Red Fescue[2] | 20% |
| Kentucky 31 Tall Fescue[2] | 15% |
| Redtop | 10% |
| Perennial ryegrass | 20% |
| White clover | 5% |
| Birdsfoot Trefoil (Minimum 20% hard seed) | 10% |

2. **Pasture Mix**

*(For use only in disturbed pasture areas with landowner's permission.)*

| **Pasture Mix** | 20 lbs./acre PLS |
|---|---|
| Kentucky Bluegrass | 31% |
| Medium Red clover | 26% |
| Norcen Trefoil | 17% |
| Poly Perennial Rye | 26% |

3. **Recommended Seeding Dates**:

*(For the establishment of temporary or permanent vegetation.)*

| | |
|---|---|
| Spring: | March 15 - May 30 |
| Fall: | August 1 - October 15 |

### WINTER STABILIZATION

If restoration can not occur prior to October 15, seed the ROW with 1.5 bushels per acre of winter rye or similar variety of rye as requested by the landowner. Mulch ROW at 3.0 tons per acre with wheat straw, including areas adjacent to streams and wetland crossings. Seed segregated topsoil piles with winter rye and mulch at a rate of 3.0 tons per acre.

### WETLAND AREAS

**DO NOT USE LIME OR FERTILIZER !!!**

| | |
|---|---|
| Mulch (Wheat Straw) | 3.0 tons/acre |

1. **Wetland Seed Mix**

| | |
|---|---|
| Annual Ryegrass | 40 lbs./acre PLS |

---

[1] The Northern Zone is generally defined as extending north from the Northern borders of Arkansas and Tennessee.

[2] Fescue must be endophyte-free.

# SEED MIX RECOMMENDATIONS

"SOUTHERN ZONE"[1]

## UPLAND AREAS

| | |
|---|---|
| Lime (agricultural limestone) | 2.5 tons/acre |
| Fertilizer (6-12-12) | 950 lbs./acre |
| Mulch (Oats, Wheat or Bermudagrass Straw) | 3.0 tons/acre |

1. **Seed Mixture**[2]

| | |
|---|---|
| Sorghum, Sudangrass, or Sudangrass Hybrids[3] | 40 lbs/acre Pure Live Seed (PLS) |
| Kentucky 31 Tall Fescue[4] | 10 lbs/acre PLS |
| Big Bluestem | 10 lbs/acre PLS |
| Indiangrass | 10 lbs/acre PLS |
| Bermudagrass | 10 lbs/acre PLS |
| Sericea Lespedeza[5] | 10 lbs/acre PLS |
| White Clover[5] | 5 lbs/acre PLS |
| Birdsfoot Trefoil[5] | 10 lbs/acre PLS |

2. **Recommended seeding dates:**

*(For establishment of temporary or permanent vegetation.)*

| | |
|---|---|
| Spring: | March 15 - May 30 |
| Fall: | August 1 - October 15 |

## WINTER STABILIZATION

If restoration can not occur prior to October 15, seed the ROW with 1.5 bushels per acre of winter rye or similar variety of rye as requested by the landowner. Mulch ROW at 3.0 tons per acre with wheat straw, including areas adjacent to stream and wetland crossings. Seed segregated topsoil piles with winter rye and mulch at a rate of 3.0 tons per acre.

## WETLAND AREAS

**DO NOT USE LIME OR FERTILIZER !!!**

| | |
|---|---|
| Mulch (Oats, Wheat, or Bermudagrass Straw) | 3.0 tons/acre |

1. **Wetland Seed Mix**:

| | |
|---|---|
| Annual Ryegrass | 40 lbs/acre PLS |

---

[1] The Southern Zone is generally defined as extending south from the Northern borders of Arkansas and Tennessee.

[2] An alternative seed mixture may be requested by the landowner(s).

[3] These species may be sold under the following trade names: DeKalb SX17 , Greentreat II, Greentreat III, Tastemaker DR, Tastemaker III, FFR202, or Sordan 79.

[4] Fescue must be endophyte-free.

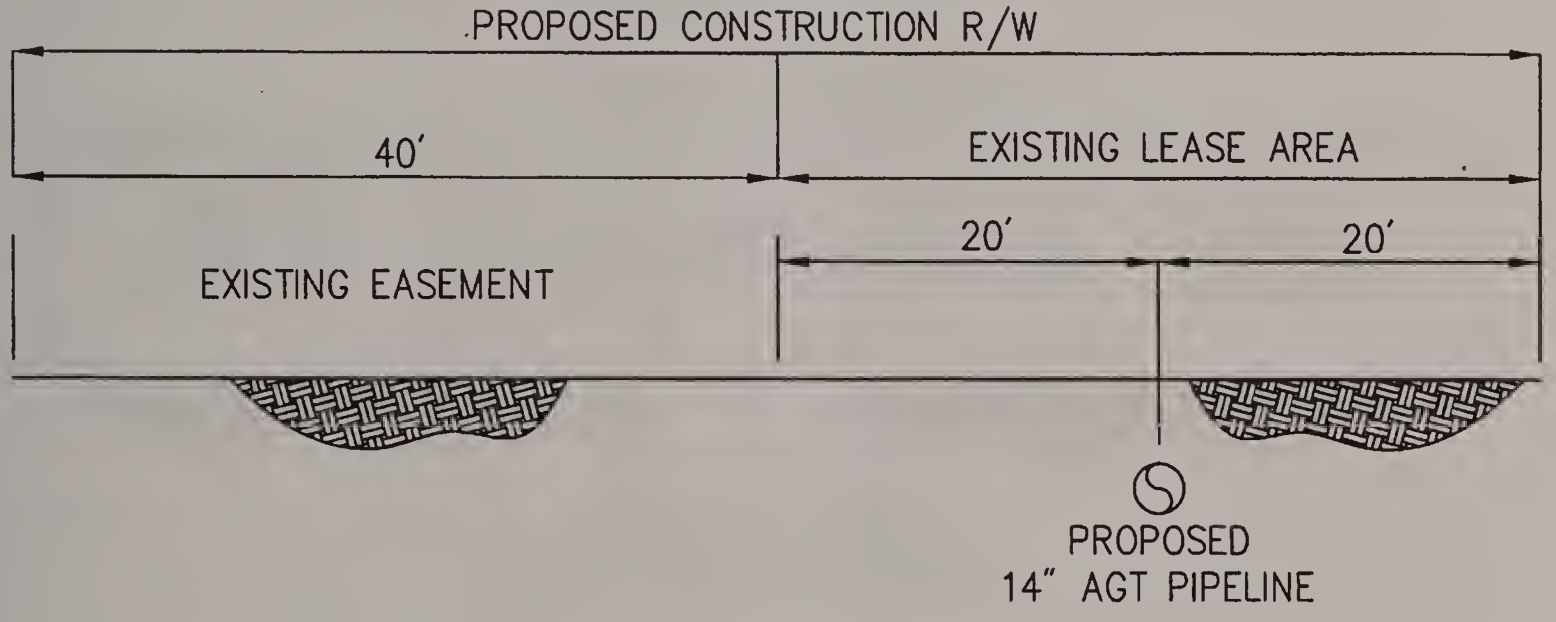
[5] Legumes should be treated with a species specific inoculate prior to seeding. Legume seed and soil should be scarified.

Spectra Energy

# *Appendix E – Typical Right-of-Way Cross Sections*

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF MEDFORD

## FIGURE–1



SECTION

STA:0+00 TO STA:0+25

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WAT WN, MASS.
\\Mawald\ld\08000.52\cad\sr\planset\08000.52–AGT–FELLS C DETAILS.dwg

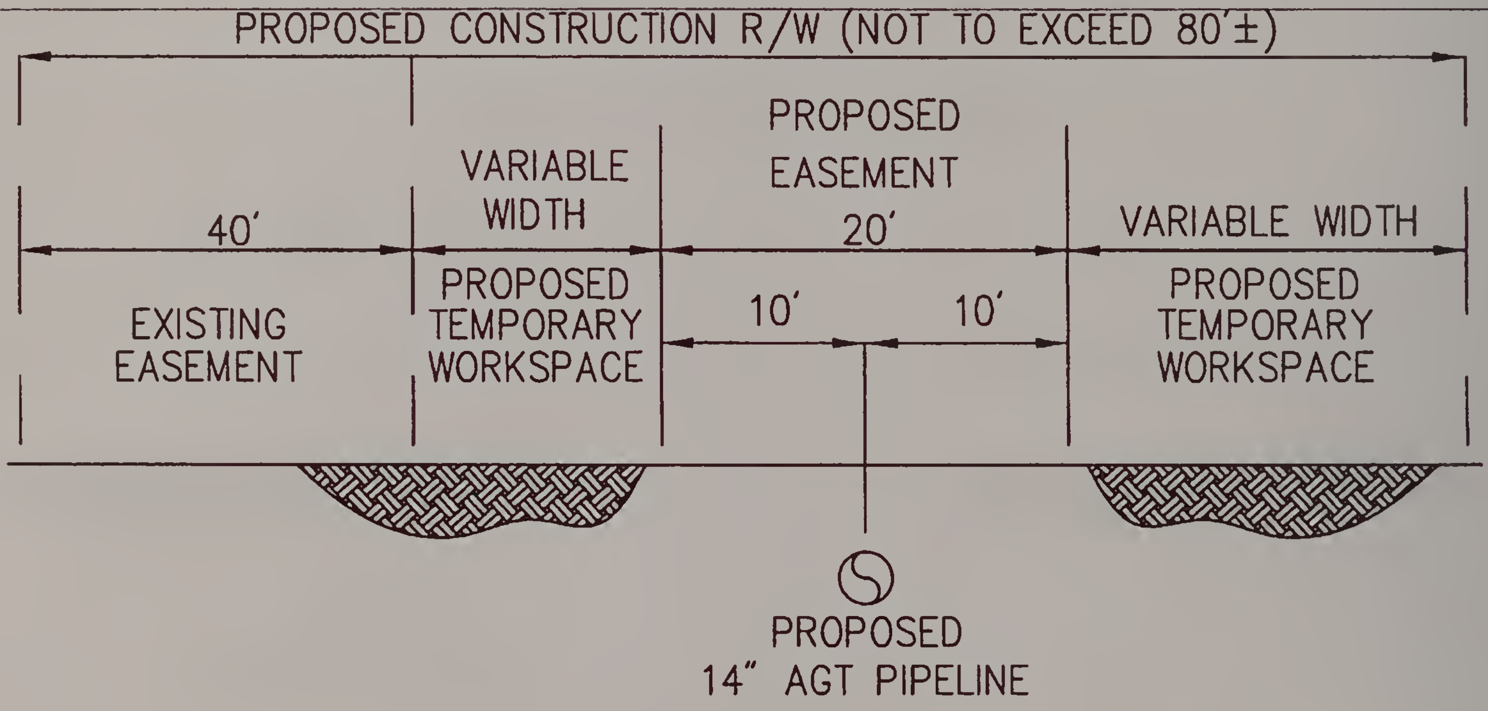
| | | | |
|---|---|---|---|
| TITLE: ALGONQUIN J–2 LOOP PROJECT<br>RIGHT–OF–WAY CONFIGURATION 1 | | | |
| LOC: MIDDLESEX COUNTY, MASSACHUSETTS | | | REV. A |
| CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598 |
| DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2001 | |

Spectra Energy℠

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF MEDFORD

## FIGURE–2


PROPOSED CONSTRUCTION R/W (NOT TO EXCEED 80'±)
40'
EXISTING EASEMENT
VARIABLE WIDTH
PROPOSED TEMPORARY WORKSPACE
PROPOSED EASEMENT 20'
10'
10'
VARIABLE WIDTH
PROPOSED TEMPORARY WORKSPACE
PROPOSED 14" AGT PIPELINE

SECTION

STA:0+25 TO STA:5+47

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS-MY

ETAILS.dwg

TITLE:
ALGONQUIN J–2 LOOP PROJECT
RIGHT–OF–WAY CONFIGURATION 2

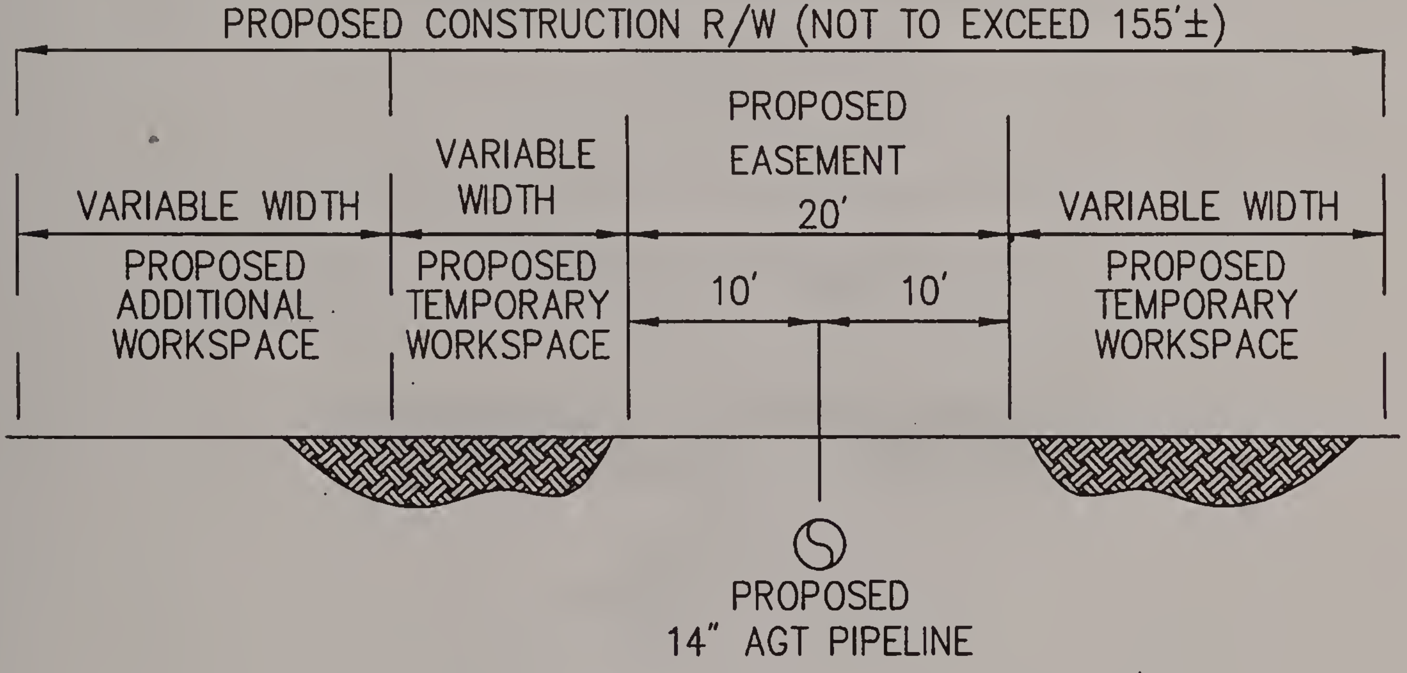
LOC: MIDDLESEX COUNTY, MASSACHUSETTS | REV. A
CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598
DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2002

Spectra Energy℠

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF MEDFORD

## FIGURE–3


PROPOSED CONSTRUCTION R/W (NOT TO EXCEED 155'±)
VARIABLE WIDTH
PROPOSED ADDITIONAL WORKSPACE
VARIABLE WIDTH
PROPOSED TEMPORARY WORKSPACE
PROPOSED EASEMENT 20'
10'
10'
VARIABLE WIDTH
PROPOSED TEMPORARY WORKSPACE
PROPOSED 14" AGT PIPELINE

SECTION

STA:5+47 TO STA:6+61

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

TITLE:
ALGONQUIN J–2 LOOP PROJECT
RIGHT–OF–WAY CONFIGURATION 3

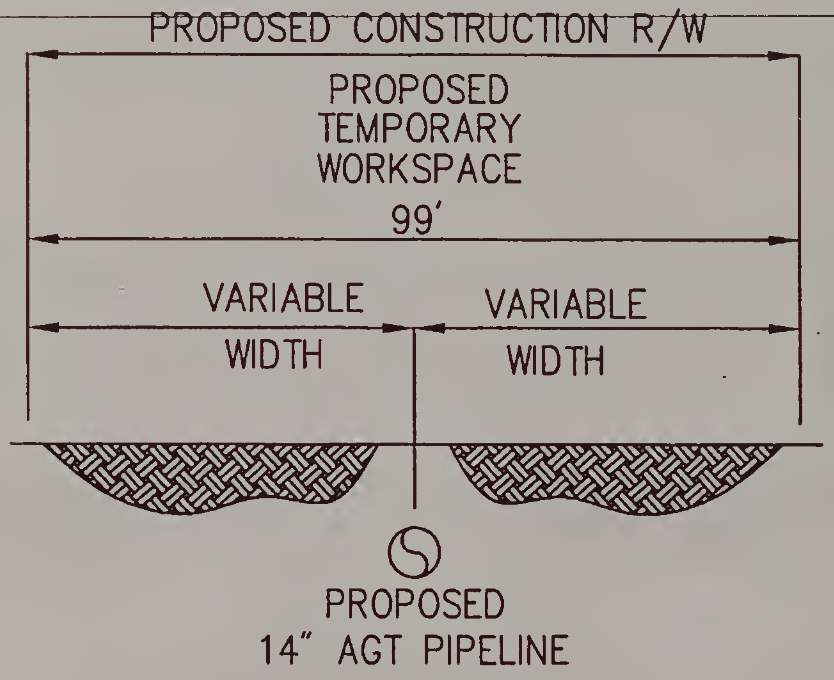
LOC: MIDDLESEX COUNTY, MASSACHUSETTS
REV. A
CKD. BY JMZ
ENG.
DATE: 4/22/2008
W.O. 004110598
DRN. BY SLT
SCALE: N/A
DWG. NO.: Z–2003

Spectra Energy
Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WA WN, MASS.
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELL STIC DETAILS.dwg

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF SOMERVILLE AND MEDFORD

## FIGURE–4



## SECTION

STA:6+61 TO STA:7+20
STA:75+07 TO STA:79+42

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

TITLE:
ALGONQUIN J–2 LOOP PROJECT
RIGHT–OF–WAY CONFIGURATION 4

LOC: MIDDLESEX COUNTY, MASSACHUSETTS | REV. A
CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598
DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2004

Spectra Energy

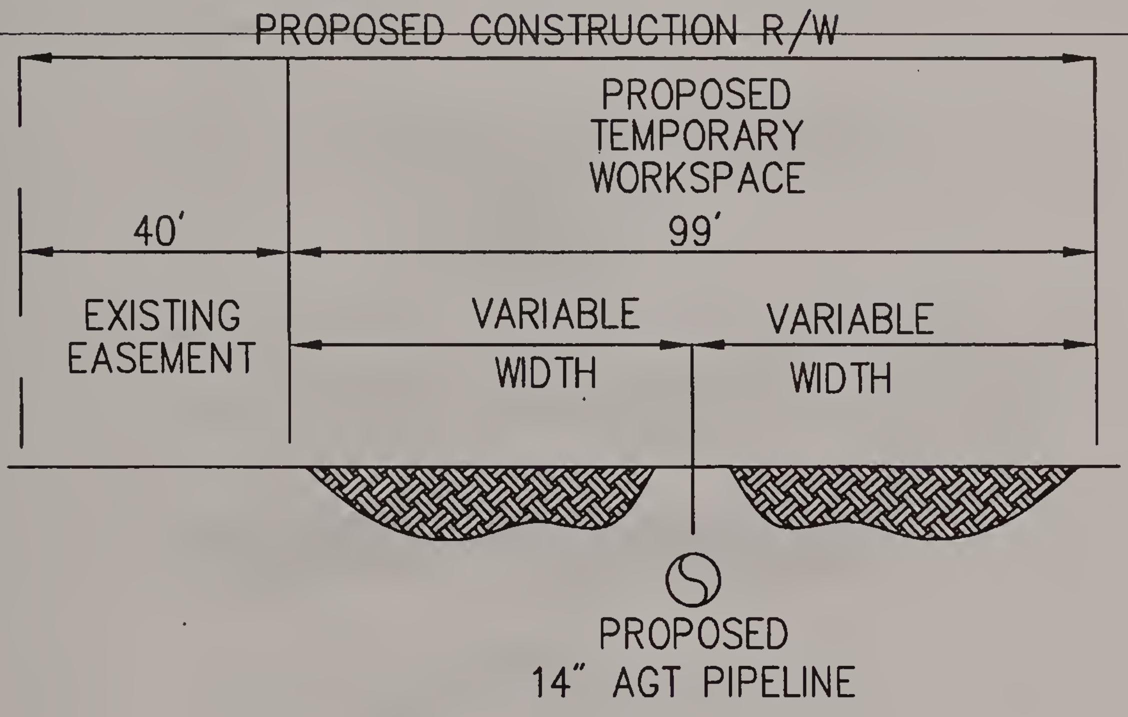
Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WATER MASS.
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS-MY DETAILS.dwg

IG. #

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF MEDFORD

## FIGURE–5



SECTION

STA:7+20 TO STA:7+68

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

TITLE:
ALGONQUIN J–2 LOOP PROJECT
RIGHT–OF–WAY CONFIGURATION 5

OC: MIDDLESEX COUNTY, MASSACHUSETTS | REV. A
CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598
DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2005

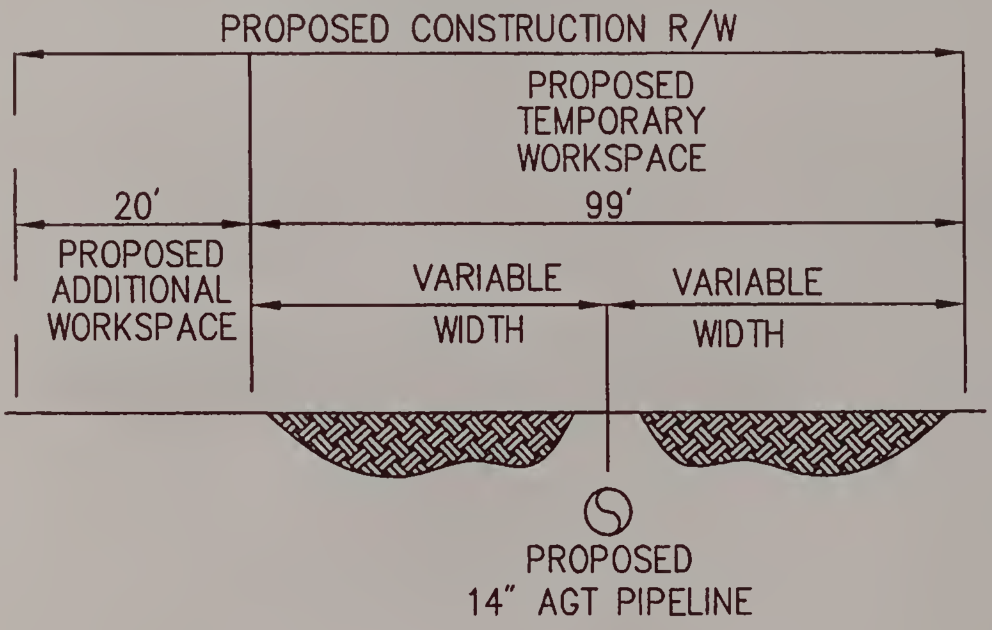
Spectra Energy

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS-MYSTIC DETAILS.dwg

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF MEDFORD

## FIGURE–6


PROPOSED CONSTRUCTION R/W
PROPOSED TEMPORARY WORKSPACE
20'
99'
PROPOSED ADDITIONAL WORKSPACE
VARIABLE WIDTH
VARIABLE WIDTH
PROPOSED 14" AGT PIPELINE

SECTION

STA:7+68 TO STA:18+18

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WATERT !ASS.
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS-MYS!.. .ETAILS.dwg

TITLE:
ALGONQUIN J–2 LOOP PROJECT
RIGHT–OF–WAY CONFIGURATION 6

Spectra Energy

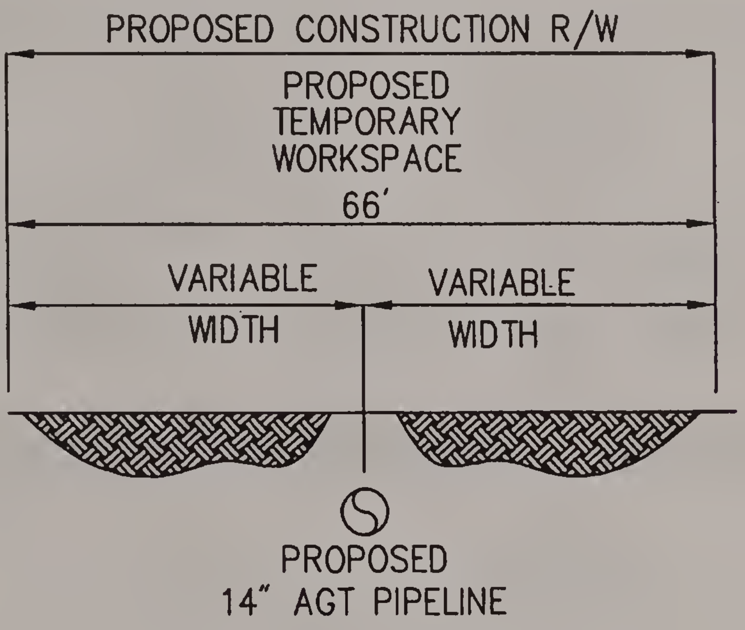
LOC: MIDDLESEX COUNTY, MASSACHUSETTS | REV. A
CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598
DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2006

IG. #

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF SOMERVILLE

## FIGURE–7



## SECTION

STA:32+12 TO STA:53+82
STA:59+97 TO STA:62+79
STA:65+22 TO STA:72+80
STA:73+51 TO STA:75+07

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WA WN, MASS.
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS TIC DETAILS.dwg

TITLE:
ALGONQUIN J–2 LOOP PROJECT
RIGHT–OF–WAY CONFIGURATION 7

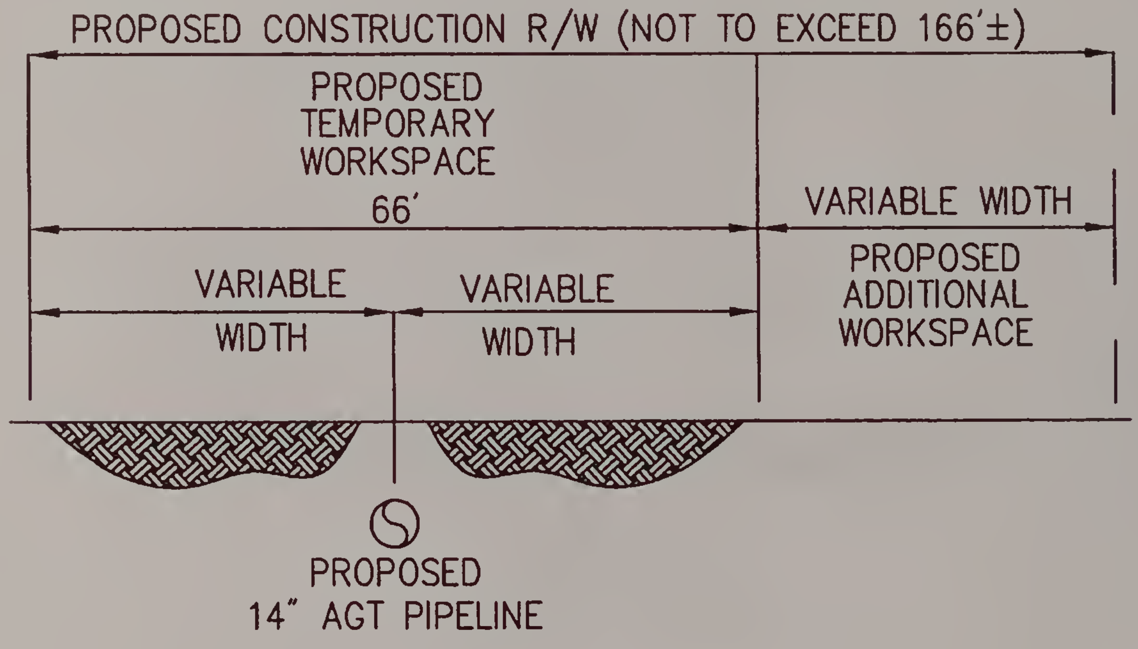
| | | | |
|---|---|---|---|
| LOC: MIDDLESEX COUNTY, MASSACHUSETTS | | | REV. A |
| CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598 |
| DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2007 | |

Spectra Energy℠

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF SOMERVILLE

## FIGURE–8


PROPOSED CONSTRUCTION R/W (NOT TO EXCEED 166'±)
PROPOSED TEMPORARY WORKSPACE
66'
VARIABLE WIDTH
VARIABLE WIDTH
VARIABLE WIDTH
PROPOSED ADDITIONAL WORKSPACE
PROPOSED 14" AGT PIPELINE

## SECTION

STA:53+82 TO STA:58+60
STA:62+79 TO STA:63+30
STA:72+80 TO STA:73+51

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WATER
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS-MY.
MASS.
ETAILS.dwg

TITLE: ALGONQUIN J–2 LOOP PROJECT
RIGHT–OF–WAY CONFIGURATION 8

| | | | |
|---|---|---|---|
| LOC: MIDDLESEX COUNTY, MASSACHUSETTS | | | REV. A |
| CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598 |
| DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2008 | |

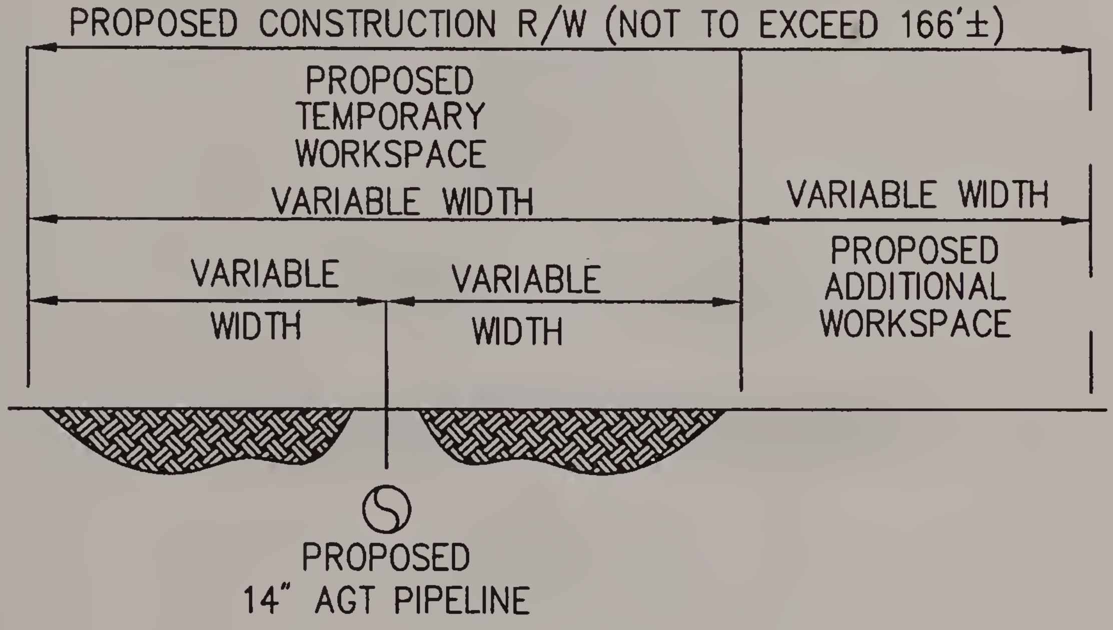
IG. #

Spectra Energy

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF SOMERVILLE

## FIGURE–9


PROPOSED CONSTRUCTION R/W (NOT TO EXCEED 166'±)
PROPOSED TEMPORARY WORKSPACE
VARIABLE WIDTH
VARIABLE WIDTH
VARIABLE WIDTH
VARIABLE WIDTH
PROPOSED ADDITIONAL WORKSPACE
PROPOSED 14" AGT PIPELINE

## SECTION

STA:58+60 TO STA:59+47
STA:63+30 TO STA:64+29

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WAT [illegible] WN, MASS.
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS [illegible] IC DETAILS.dwg

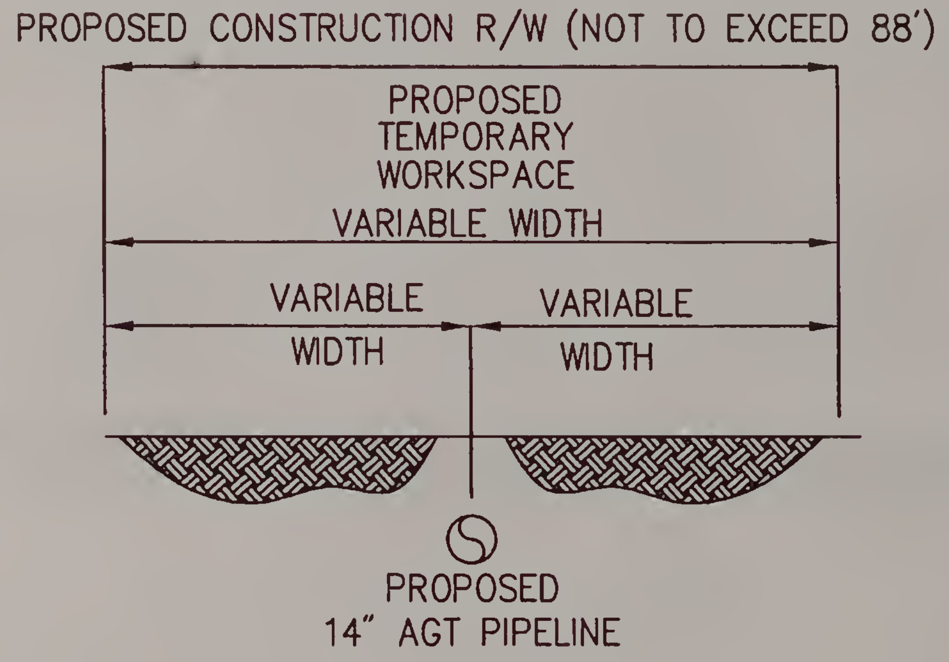
| | | | |
|---|---|---|---|
| TITLE: ALGONQUIN J–2 LOOP PROJECT<br>RIGHT–OF–WAY CONFIGURATION 9 | | | |
| LOC: MIDDLESEX COUNTY, MASSACHUSETTS | | | REV. A |
| CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598 |
| DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2009 | |

Spectra Energy

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF SOMERVILLE

## FIGURE–10



## SECTION

STA:64+29 TO STA:65+22
STA:117+19 TO STA:118+95

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

| | | | |
|---|---|---|---|
| TITLE: ALGONQUIN J–2 LOOP PROJECT<br>RIGHT–OF–WAY CONFIGURATION 10 | | | |
| LOC: MIDDLESEX COUNTY, MASSACHUSETTS | | | REV. A |
| CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598 |
| DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2010 | |

Spectra Energy℠

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

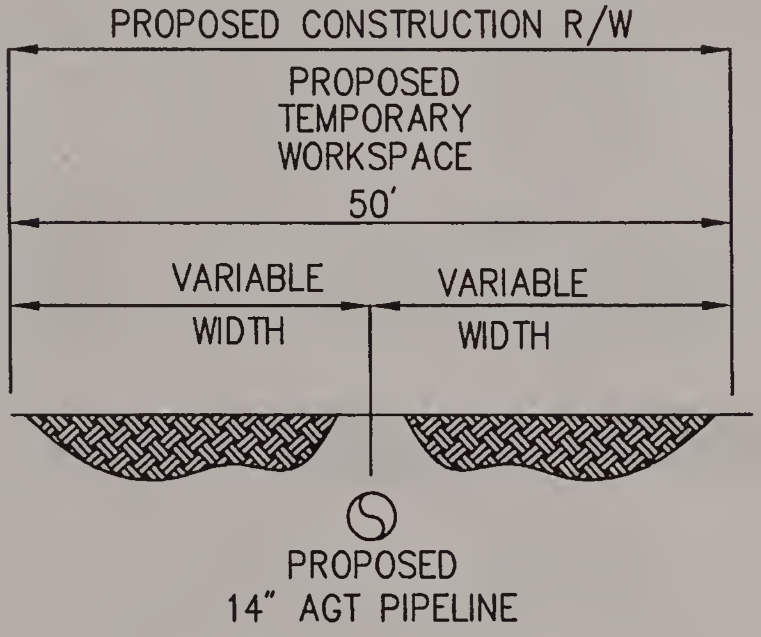
MASS.
TAILS.dwg

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WATERT
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS-MY.

IG. #

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF SOMERVILLE

## FIGURE–11


PROPOSED CONSTRUCTION R/W
PROPOSED TEMPORARY WORKSPACE
50'
VARIABLE WIDTH
VARIABLE WIDTH
PROPOSED 14" AGT PIPELINE

## SECTION

STA:79+82 TO STA:96+82
STA:104+57 TO STA:117+19

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WAT WN, MASS.
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS IC DETAILS.dwg

TITLE:
ALGONQUIN J–2 LOOP PROJECT
RIGHT–OF–WAY CONFIGURATION 11

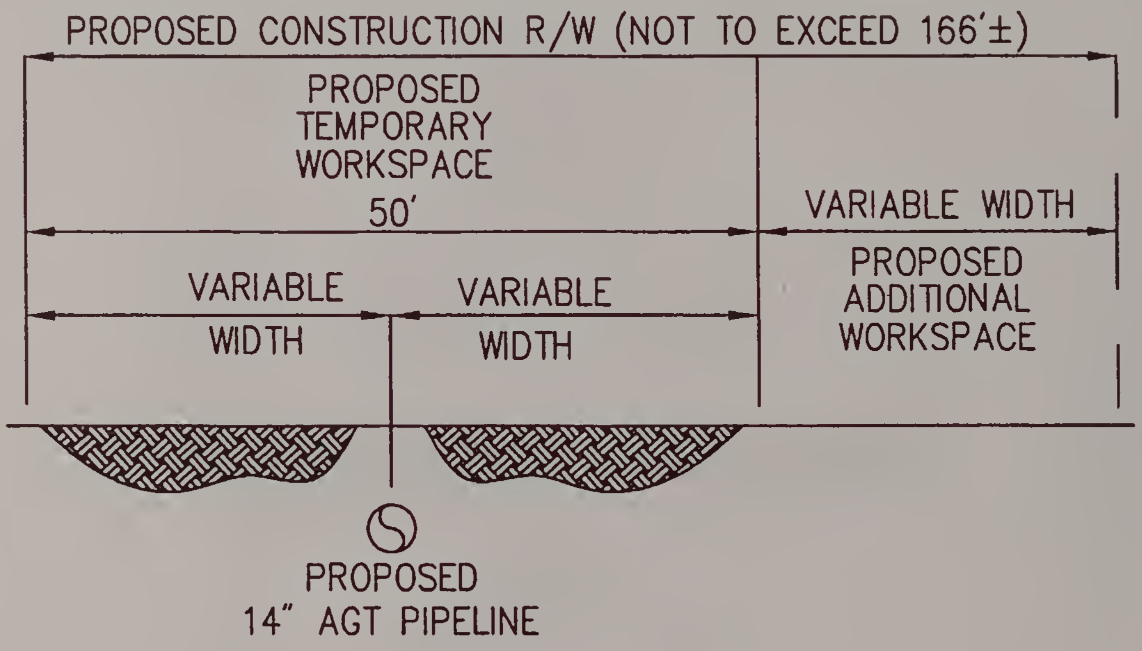
|  |  |  |  |
|---|---|---|---|
| LOC: MIDDLESEX COUNTY, MASSACHUSETTS | | | REV. A |
| CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598 |
| DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2011 | |

Spectra Energy

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF SOMERVILLE

## FIGURE–12


PROPOSED CONSTRUCTION R/W (NOT TO EXCEED 166'±)
PROPOSED TEMPORARY WORKSPACE
50'
VARIABLE WIDTH
VARIABLE WIDTH
VARIABLE WIDTH
PROPOSED ADDITIONAL WORKSPACE
PROPOSED 14" AGT PIPELINE

SECTION

STA:96+82 TO STA:100+14

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WATER MASS.
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS-MYS. JETAILS.dwg

TITLE:
ALGONQUIN J–2 LOOP PROJECT
RIGHT–OF–WAY CONFIGURATION 12

| | | | |
|---|---|---|---|
| LOC: MIDDLESEX COUNTY, MASSACHUSETTS | | | REV. A |
| CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598 |
| DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2012 | |

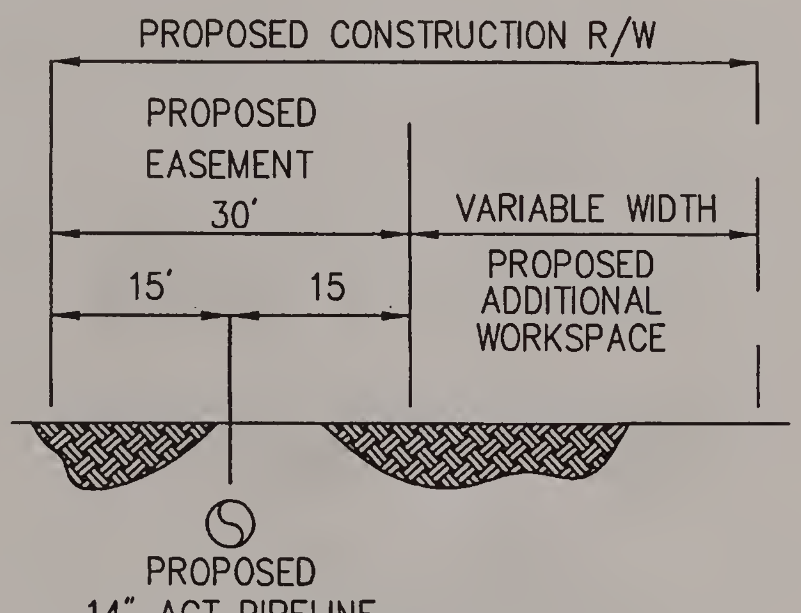
IG. #

Spectra Energy℠

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF SOMERVILLE

## FIGURE-13


PROPOSED CONSTRUCTION R/W
PROPOSED EASEMENT 30'
VARIABLE WIDTH
15'
15
PROPOSED ADDITIONAL WORKSPACE
PROPOSED 14" AGT PIPELINE

SECTION

STA:100+14 TO STA:100+60

NOTE 1 : CROSS-SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WAT N, MASS.
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS- C DETAILS.dwg

TITLE:
ALGONQUIN J-2 LOOP PROJECT
RIGHT-OF-WAY CONFIGURATION 13

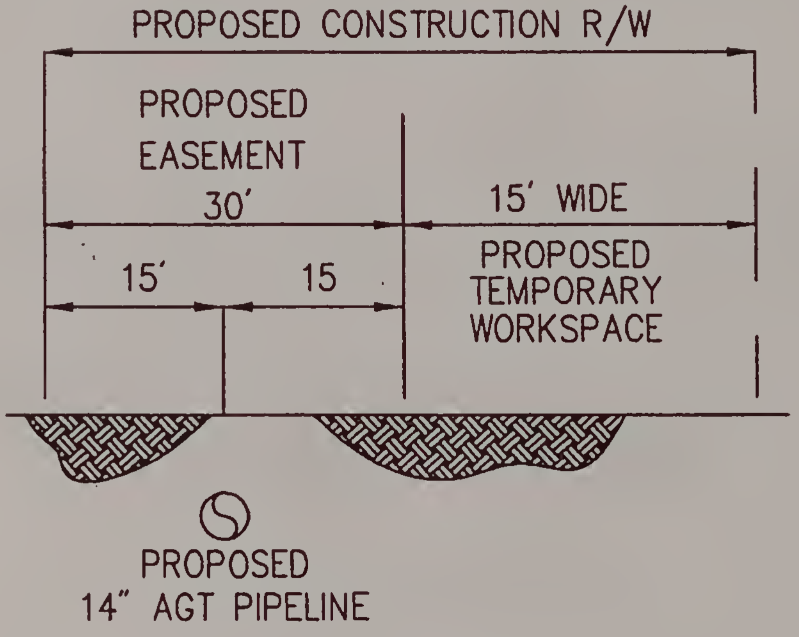
LOC: MIDDLESEX COUNTY, MASSACHUSETTS | REV. A
CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598
DRN. BY SLT | SCALE: N/A | DWG. NO.: Z-2013

Spectra Energy

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF SOMERVILLE

## FIGURE–14


PROPOSED CONSTRUCTION R/W
PROPOSED EASEMENT 30'
15' WIDE
15'
15
PROPOSED TEMPORARY WORKSPACE
PROPOSED 14" AGT PIPELINE

## SECTION

STA:100+60 TO STA:101+76

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

TITLE:
ALGONQUIN J–2 LOOP PROJECT
RIGHT–OF–WAY CONFIGURATION 14

LOC: MIDDLESEX COUNTY, MASSACHUSETTS | REV. A
CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598
DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2014

Spectra Energy

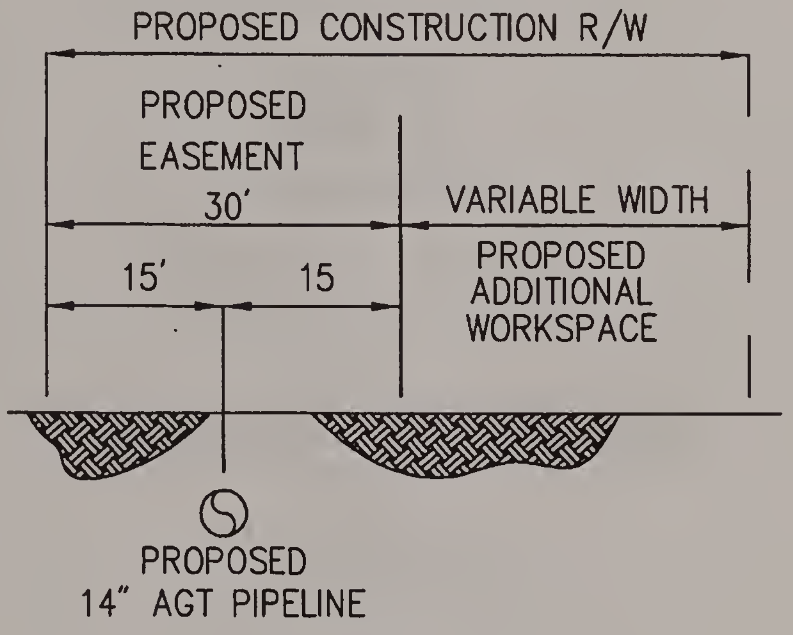
Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WATERTI ASS.
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS-MYSTI TAILS.dwg

IG. #

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF SOMERVILLE

## FIGURE–15


PROPOSED CONSTRUCTION R/W
PROPOSED EASEMENT
30'
VARIABLE WIDTH
15'
15
PROPOSED ADDITIONAL WORKSPACE
PROPOSED 14" AGT PIPELINE

SECTION

STA:101+76 TO STA:103+34

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WA WN, MASS.
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS STIC DETAILS.dwg

TITLE:
ALGONQUIN J–2 LOOP PROJECT
RIGHT–OF–WAY CONFIGURATION 15

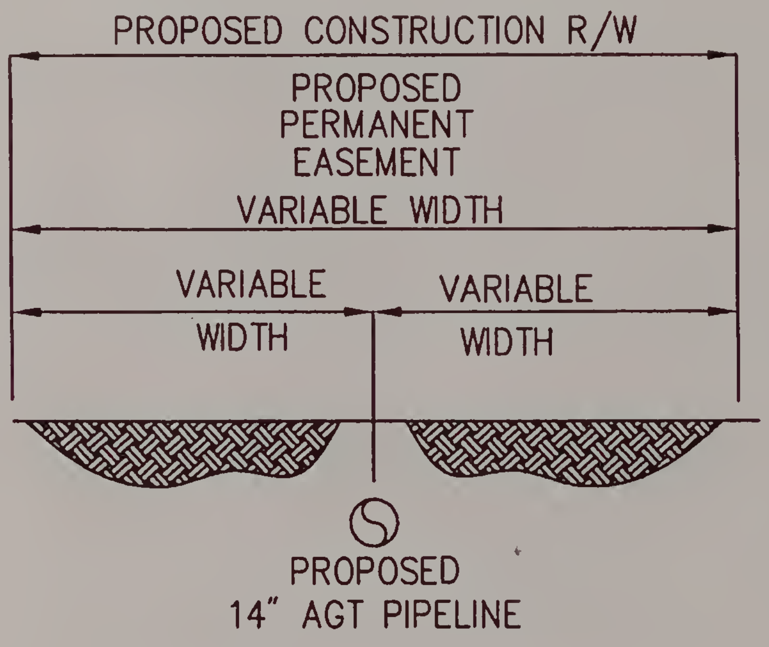
| | | | |
|---|---|---|---|
| LOC: MIDDLESEX COUNTY, MASSACHUSETTS | | | REV. A |
| CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598 |
| DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2015 | |

Spectra Energy

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF SOMERVILLE

## FIGURE–16



SECTION

STA:103+34 TO STA:104+15

NOTE 1 : CROSS–SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WATERT MASS.
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELLS-MYS. ETAILS.dwg

TITLE:
ALGONQUIN J–2 LOOP PROJECT
RIGHT–OF–WAY CONFIGURATION 16

| | | | |
|---|---|---|---|
| LOC: MIDDLESEX COUNTY, MASSACHUSETTS | | | REV. A |
| CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598 |
| DRN. BY SLT | SCALE: N/A | DWG. NO.: Z–2016 | |

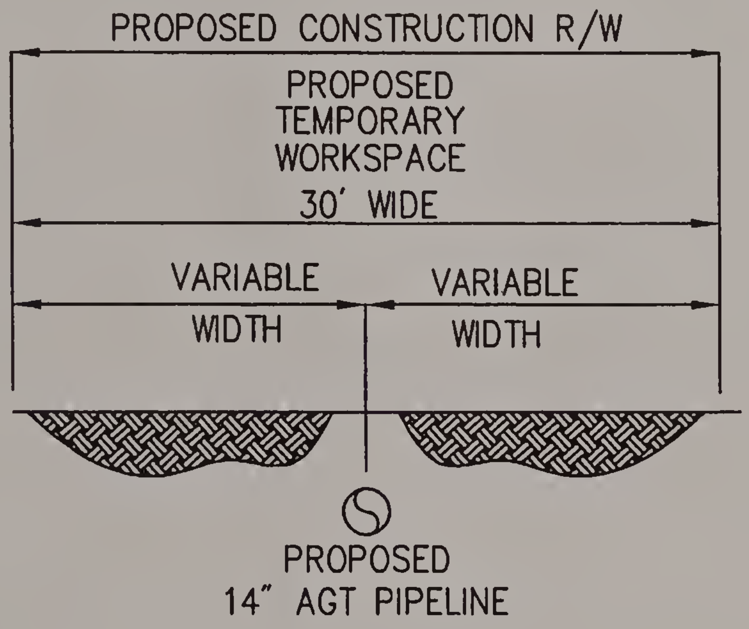
Spectra Energy

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

IG. #

# MIDDLESEX COUNTY, MASSACHUSETTS
# CITY OF SOMERVILLE

## FIGURE-17



## SECTION

STA:104+15 TO STA:104+57

NOTE 1 : CROSS-SECTION LOOKING IN DIRECTION OF GAS FLOW.

NOTE 2 : ALIGNMENT IS SUBJECT TO DEVIATIONS BASED ON TOPOGRAPHY AND STRUCTURES ABOVE AND BELOW GROUND. MINOR ALIGNMENT DEVIATIONS MAY BE NECESSARY TO ACCOMMODATE INDIVIDUAL LAND OWNERS, WHERE APPLICABLE

PREPARED BY VANASSE HANGEN BRUSTLIN, INC. WA WN, MASS.
\\Mawald\ld\08000.52\cad\sr\planset\08000.52-AGT-FELL TIC DETAILS.dwg

| | | | |
|---|---|---|---|
| TITLE: ALGONQUIN J-2 LOOP PROJECT<br>RIGHT-OF-WAY CONFIGURATION 17 | | | Spectra Energy |
| LOC: MIDDLESEX COUNTY, MASSACHUSETTS | | REV. A | |
| CKD. BY JMZ | ENG. | DATE: 4/22/2008 | W.O. 004110598 |
| DRN. BY SLT | SCALE: N/A | DWG. NO.: Z-2017 | |

Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

# MIDDLESEX COUNTY MASSACHUSETTS
# CITY OF SOMERVILLE

| RIGHT-OF-WAY<br>TRACT NUMBERS<br>OWNERSHIP/AGENCY | TRACT J-2L-7<br>CITY OF SOMERVILLE<br>MEDFORD STREET | TRACT J-2L-8<br>CITY OF SOMERVILLE | TRACT J-2L-9<br>B & M RAILROAD | TRACT J-2L-10<br>BOSTON EDISON | TRACT J-2L-11<br>CITY OF SOMERVILLE<br>MEDFORD STREET |
|---|---|---|---|---|---|
| SURVEY DATA<br>SURVEY COMPANY: VHB WATERTOWN MA<br>FIELD BOOK:<br>PAGES: | STA:99+88<br>PI 50°-02' RT.<br>STA:100+14 | PROPERTY LINE<br>STA:100+64 | PROPERTY LINE<br>STA:100+67<br>PI 8°-35' LT.<br>STA:101+41 | PROPERTY LINE<br>STA:101+67<br>PI 65°-22' LT.<br>STA:104+56<br>PI 5°-21' RT.<br>STA:104+57 | PROPERTY LINE<br>STA:105+96<br>PI 19°17' RT.<br>STA:105+67<br>PI 1°-31' LT. |

WORKSPACE DETAILS
SCALE: N.T.S.

LEGEND

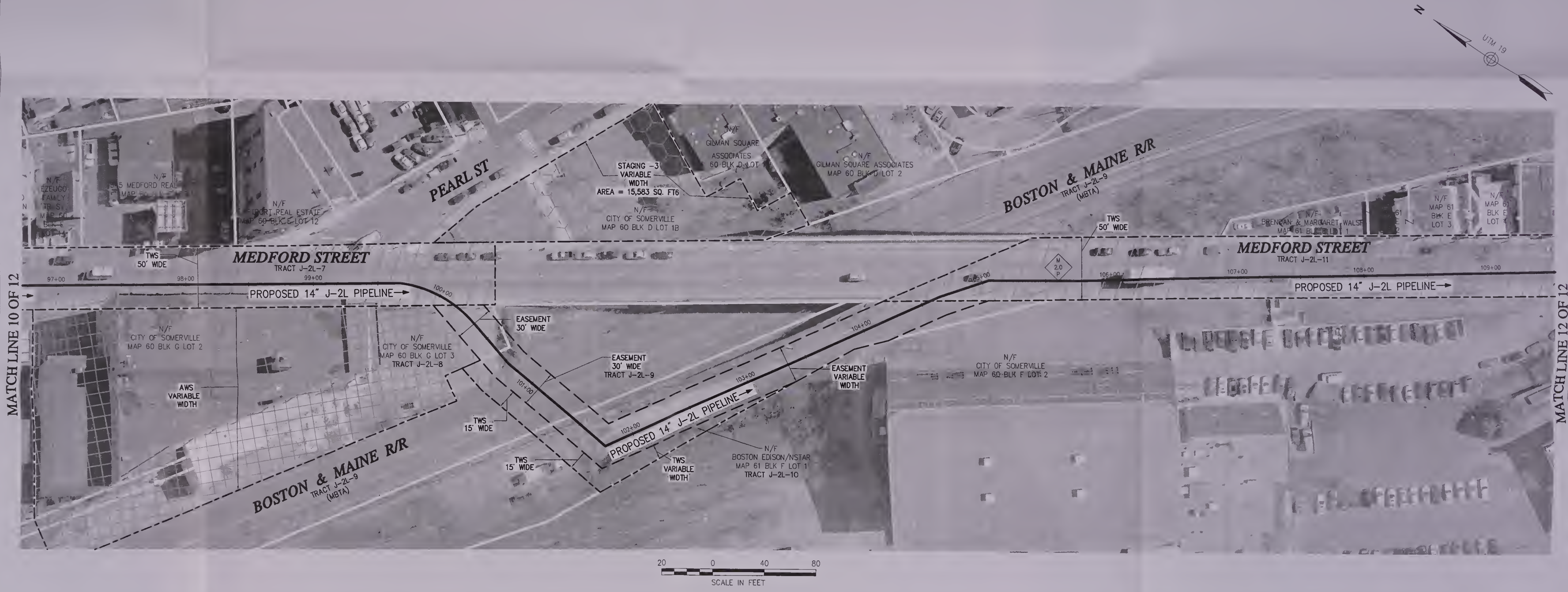
- PROPOSED NEW PERMANENT EASEMENT
- PROPOSED STAGING AREA
- PROPOSED TEMPORARY ACCESS ROAD (TAR)
- PROPOSED TEMPORARY WORKSPACE (TWS)
- PROPOSED ADDITIONAL TEMPORARY WORKSPACE (AWS)

ALIGNMENT DETAIL

LEGEND

- PROPERTY LINE
- PROPOSED PIPELINE
- EXISTING AGT EASEMENT
- TEMP. WORKSPACE
- ADDITIONAL TEMP. WORKSPACE
- STAGING AREA
- TEMP. ACCESS ROAD
- EXISTING AGT PIPELINE
- EXISTING EASEMENT
- STREAM/DITCH
- WETLAND BOUNDARY
- WETLANDS
- PIPELINE MILEPOST

DATE OF AERIAL PHOTOGRAPHY: 3-29-2007


N
UTM 19
MATCH LINE 10 OF 12
N/F EZEUGO FAMILY TR S MAP 60 BLK E LOT 11
N/F 345 MEDFORD REAL MAP 60
N/F PORT REAL ESTATE MAP 60 BLK E LOT 12
PEARL ST
STAGING -3 VARIABLE WIDTH AREA = 15,583 SQ. FT6
N/F GILMAN SQUARE ASSOCIATES 60 BLK D LOT 1
N/F GILMAN SQUARE ASSOCIATES MAP 60 BLK D LOT 2
N/F CITY OF SOMERVILLE MAP 60 BLK D LOT 1B
BOSTON & MAINE R/R TRACT J-2L-9 (MBTA)
TWS 50' WIDE
N/F BRENDAN & MARGARET WALSH MAP 61 BLK E LOT 1
N/F MAP 61 BLK E LOT 3
N/F MAP 61 BLK E LOT 4
MEDFORD STREET TRACT J-2L-7
97+00
98+00
99+00
100+00
PROPOSED 14" J-2L PIPELINE→
M 2.0 P
106+00
107+00
108+00
109+00
MEDFORD STREET TRACT J-2L-11
EASEMENT 30' WIDE
N/F CITY OF SOMERVILLE MAP 60 BLK G LOT 2
N/F CITY OF SOMERVILLE MAP 60 BLK G LOT 3 TRACT J-2L-8
AWS VARIABLE WIDTH
EASEMENT 30' WIDE TRACT J-2L-9
101+00
102+00
103+00
104+00
105+00
EASEMENT VARIABLE WIDTH
N/F CITY OF SOMERVILLE MAP 60 BLK F LOT 2
TWS 15' WIDE
TWS 15' WIDE
TWS VARIABLE WIDTH
N/F BOSTON EDISON/NSTAR MAP 61 BLK F LOT 1 TRACT J-2L-10
BOSTON & MAINE R/R TRACT J-2L-9 (MBTA)
MATCH LINE 12 OF 12
20 0 40 80
SCALE IN FEET

## General Notes

1) THE PROPERTY LINES SHOWN ON THIS PLAN WERE COMPILED FROM LOCAL ASSESSOR'S PLATS AND FROM PREVIOUS PLANS AND DEEDS OF RECORD. VHB HAS NOT PERFORMED A FIELD SURVEY TO VERIFY THE PROPERTY LINES.
2) THE EXISTING CONDITIONS SHOWN ON THIS PLAN WERE DEVELOPED FROM A COMBINED EFFORT OF AERIAL PHOTOGRAMMETRIC MAPPING BY GOLDEN AERIAL, INC, BASED ON AERIAL PHOTOGRAPHS TAKEN ON MARCH 29, 2007, AND AUGMENTED BY AN ON-THE-GROUND SURVEY PERFORMED BY VHB DURING NOVEMBER 2007.
3) HORIZONTAL DATUM IS BASED ON UTM 19 PROJECTIONS, NAD 1983.
4) THE WETLANDS SHOWN ON THIS PLAN WERE DELINEATED BY ENSR ENVIRONMENTAL INC, AND FIELD SURVEYED BY VHB IN NOVEMBER 2007.

E & S FIGURES APPLICABLE TO ALL AREAS

| DWG. NO. | REFERENCE DWG. | REV | DSN | CK | DESCRIPTION |
|---|---|---|---|---|---|
| 4981 | MHWY L.O. 1960 INT. 93 | △ | | | |
| 5561 | MHWY L.O. 1966 ROUTE 93 | △ | | | |
| – | MHWY L.O. MYSTIC AVE. MEDFORD AND SOMERVILLE | △ | | | |
| 5563 | MHWY L.O. 1908/1966 INT 93 | △ | | | |
| 5564 | MHWY L.O. 1966 INT. 93 | △ | | | |
| 5723 | MHWY L.O. 1966 INT. 93 | △ | | | |

IG #

VHB
Vanasse Hangen Brustlin, Inc.
Transportation
Land Development
Environmental Services
101 Walnut Street, P.O. Box 9151
Watertown, Massachusetts 02471-9151
617 924 1770 • FAX 617 924 2286

| | ENGINEERING APPROVALS | | | |
|---|---|---|---|---|
| DRAWN BY: | BID | | CONSTRUCTION | |
| SLT | | 4/08 | | |
| | | | | |
| | | | | |
| | | | | |
| TITLE | SIGNATURE | DATE | SIGNATURE | DATE |

**J-2 LOOP PROJECT**
ALIGNMENT SHEET

LOC. SOMERVILLE MA

YEAR: 2008 | W.O. 004110598 | SCALE: 1"=40'

Spectra Energy
Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

DWG. Z-2000 | 11 OF 12 | REV. A

# MIDDLESEX COUNTY MASSACHUSETTS
# CITY OF SOMERVILLE

## RIGHT-OF-WAY

TRACT NUMBERS
OWNERSHIP/AGENCY

TRACT J-2L-11
CITY OF SOMERVILLE
MEDFORD STREET

TRACT J-2L-12
COMMONWEALTH OF MASSACHUSETTS
(DCR)
MCGRATH HWY

## SURVEY DATA

SURVEY COMPANY: VHB WATERTOWN MA
FIELD BOOK:
PAGES:

STA:116+32
PI 17°-03' LT.
STA:116+82
PI 17°-41' RT.
STA:119+68
PI 15°-19' LT.
STA:119+70
PROPERTY LINE
STA:120+31
PI 113°-18 LT.

## WORKSPACE DETAILS
SCALE: N.T.S.

LEGEND

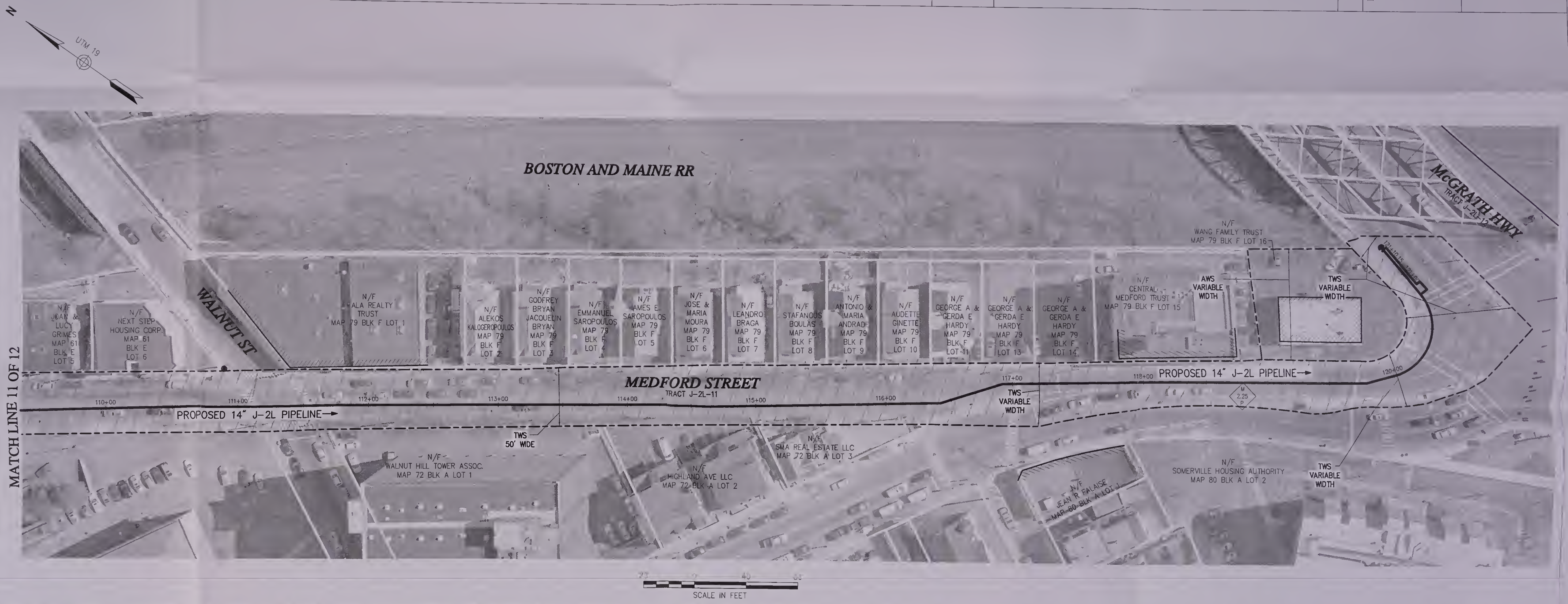
| | |
|---|---|
| ⌐ ¬ | PROPOSED NEW PERMANENT EASEMENT |
| ▭ | PROPOSED STAGING AREA |
| ▭ | PROPOSED TEMPORARY ACCESS ROAD (TAR) |
| ▭ | PROPOSED TEMPORARY WORKSPACE (TWS) |
| ▨ | PROPOSED ADDITIONAL TEMPORARY WORKSPACE (AWS) |

## ALIGNMENT DETAIL

LEGEND

| | |
|---|---|
| ▬ | PROPERTY LINE |
| ━━━ | PROPOSED PIPELINE |
| ── ── | EXISTING AGT EASEMENT |
| ── ‒ ── | TEMP. WORKSPACE |
| ── ‒ ── | ADDITIONAL TEMP. WORKSPACE |
| ── ‒ ── | STAGING AREA |
| ── ‒ ── | TEMP. ACCESS ROAD |
| ── ‒ ── | EXISTING AGT PIPELINE |
| ─ ─ ─ ─ | EXISTING EASEMENT |
| ──··── | STREAM/DITCH |
| ──── | WETLAND BOUNDARY |
| ▨ | WETLANDS |
| ◇ M X.X P | PIPELINE MILEPOST |

DATE OF AERIAL PHOTOGRAPHY: 3-29-2007


N
UTM 19
BOSTON AND MAINE RR
McGRATH HWY
TRACT J-2L-12
WALNUT ST
MATCH LINE 11 OF 12
N/F JOAN & LUCY GRIMES MAP 61 BLK E LOT 5
N/F NEXT STEP HOUSING CORP. MAP 61 BLK E LOT 6
N/F ALA REALTY TRUST MAP 79 BLK F LOT 1
N/F ALEKOS KALOGEROPOULOS MAP 79 BLK F LOT 2
N/F GODFREY BRYAN JACOUELIN BRYAN MAP 79 BLK F LOT 3
N/F EMMANUEL SAROPOULOS MAP 79 BLK F LOT 4
N/F AMES E SAROPOULOS MAP 79 BLK F LOT 5
N/F JOSE & MARIA MOURA MAP 79 BLK F LOT 6
N/F LEANDRO BRAGA MAP 79 BLK F LOT 7
N/F STAFANOUS BOULAS MAP 79 BLK F LOT 8
N/F ANTONIO & MARIA ANDRAD MAP 79 BLK F LOT 9
N/F AUDETTE GINETTE MAP 79 BLK F LOT 10
N/F GEORGE A & GERDA E HARDY MAP 79 BLK F LOT 11
N/F GEORGE A & GERDA E HARDY MAP 79 BLK F LOT 13
N/F GEORGE A & GERDA E HARDY MAP 79 BLK F LOT 14
N/F CENTRAL MEDFORD TRUST MAP 79 BLK F LOT 15
N/F WANG FAMILY TRUST MAP 79 BLK F LOT 16
AWS VARIABLE WIDTH
TWS VARIABLE WIDTH
121+10.15
121+00
MEDFORD STREET
TRACT J-2L-11
110+00
111+00
112+00
113+00
114+00
115+00
116+00
117+00
118+00
120+00
PROPOSED 14" J-2L PIPELINE→
PROPOSED 14" J-2L PIPELINE→
TWS 50' WIDE
TWS VARIABLE WIDTH
M 2.25 P
N/F WALNUT HILL TOWER ASSOC. MAP 72 BLK A LOT 1
N/F HIGHLAND AVE LLC MAP 72 BLK A LOT 2
N/F SMA REAL ESTATE LLC MAP 72 BLK A LOT 3
N/F JEAN R FALAISE MAP 80 BLK A LOT 1
N/F SOMERVILLE HOUSING AUTHORITY MAP 80 BLK A LOT 2
TWS VARIABLE WIDTH
SCALE IN FEET

## General Notes

1) THE PROPERTY LINES SHOWN ON THIS PLAN WERE COMPILED FROM LOCAL ASSESSOR'S PLATS AND FROM PREVIOUS PLANS AND DEEDS OF RECORD. VHB HAS NOT PERFORMED A FIELD SURVEY TO VERIFY THE PROPERTY LINES.

2) THE EXISTING CONDITIONS SHOWN ON THIS PLAN WERE DEVELOPED FROM A COMBINED EFFORT OF AERIAL PHOTOGRAMMETRIC MAPPING BY GOLDEN AERIAL, INC. BASED ON AERIAL PHOTOGRAPHS TAKEN ON MARCH 29, 2007, AND AUGMENTED BY AN ON-THE-GROUND SURVE PERFORMED BY VHB DURING NOVEMBER 2007.

3) HORIZONTAL DATUM IS BASED ON UTM 19 PROJECTIONS, NAD 1983.

4) THE WETLANDS SHOWN ON THIS PLAN WERE DELINEATED BY ENSR ENVIRONMENTAL INC, AND FIELD SURVEYED BY VHB IN NOVEMBER 2007.

E & S FIGURES APPLICABLE TO ALL AREAS

| DWG. NO. | REFERENCE DWG. | REV | DSN | CK | DESCRIPTION |
|---|---|---|---|---|---|
| 4981 | MHWY L.O. 1960 INT. 93 | △ | | | |
| 5561 | MHWY L.O. 1966 ROUTE 93 | △ | | | |
| – | MHWY L.O. MYSTIC AVE. MEDFORD AND SOMERVILLE | △ | | | |
| 5563 | MHWY L.O. 1908/1966 INT 93 | △ | | | |
| 5564 | MHWY L.O. 1966 INT. 93 | △ | | | |
| 5723 | MHWY L.O. 1966 INT. 93 | △ | | | |

IG.#

**VHB**
*Vanasse Hangen Brustlin, Inc.*
Transportation
Land Development
Environmental Services
101 Walnut Street, P.O. Box 9151
Watertown, Massachusetts 02471-9151
617 924 1770 • FAX 617 924 2286

ENGINEERING APPROVALS

| DRAWN BY: | BID | | CONSTRUCTION | |
|---|---|---|---|---|
| SLT | | 4/08 | | |
| | | | | |
| | | | | |
| TITLE | SIGNATURE | DATE | SIGNATURE | DATE |

**J-2 LOOP PROJECT**
ALIGNMENT SHEET
LOC. SOMERVILLE MA

**Spectra Energy**
Algonquin Gas Transmission, LLC
5400 Westheimer Court, Houston, TX 77056-5310

YEAR: 2008 | W.O. 004110598 | SCALE: 1"=40' | DWG. Z-2000 12 OF 12 | REV. A

\\Mawarf\d\[illegible]\ad\s\p[illegible]set\0800[illegible]-AGT-FERC3 08.dwg [illegible] TIME: [illegible] PM